ANXIETY, DEPRESSION AND WORK LIFE
The Hordaland Health Study

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Contents

1. Acknowledgements

2. Abbreviations

CI: Confidence interval.

CIDI: Composite International Diagnostic Interview.

DCSQ: The Swedish Demand-Control-Support Questionnaire.

DIS: Diagnostic Interview Schedule.

ECA: The Epidemiologic Catchment Area Study.

ERI: The Effort-Reward Imbalance model.

GAM: Generalised Additive Model.

HADS: The Hospital Anxiety and Depression Scale; HADS-A: Anxiety score; HADS-D: Depression score.

HUSK: The Hordaland Health Study 1997-99.

ISCO(-88): The International Standard Classification of Occupations.

JDC(S) model: The Job-Demand-Control (-Support) model.

MDD: Major depressive disorder.

MOG: Major occupational group/-ing.

NCS(-R): The National Comorbidity Survey (Replication).

OR: Odds ratio.

PE: Prevalence estimate.

R^2: Explained variance.

SAQ: Self-administered questionnaire.

SES: Socioeconomic status.

SHUS: Statens helseundersøkelser, or the National Health Screening Service.

SIC(-94): The Standard Industrial Classification.

SRC: Standardized regression coefficient.

3. List of papers

The dissertation consists of the following papers:

Paper I: Sanne B, Mykletun A, Dahl AA, Moen BE, Tell GS. Occupational differences in levels of   anxiety and depression: The Hordaland Health Study. J Occup Environ Med 2003;45:628-638.

Paper II: Sanne B, Mykletun A, Moen BE, Dahl AA, Tell GS. Farmers are at risk for anxiety and depression: The Hordaland Health Study. Occup Med 2004;54:92-100.

Paper III: Sanne B, Torp S, Mykletun A, Dahl AA. The Swedish Demand-Control-Support Questionnaire (DCSQ): factor structure, item analyses and internal consistency in a large population. Submitted to Scand J Public Health 2004.

Paper IV: Sanne B, Mykletun A, Dahl AA, Moen BE, Tell GS. Testing the Job Demand-Control-Support model with anxiety and depression as outcomes: The Hordaland Health Study. Submitted to Occup Med 2004.

4. Introduction

4.1 Background

Anxiety and depression are major health problems. The Global Burden of Disease Study showed that in 1990, unipolar major depression was the most important cause of world-wide burden of death and disability in midlife (1). No other disease or condition, somatic or psychiatric, accounted for even half the burden imposed by depression. There is a growing awareness of the societal costs imposed by anxiety and depressive disorders (2, 3). Absenteeism and reduced capacity at work account for a considerable part of this burden. The societal costs of anxiety disorders have been estimated to be at least as high as the costs of depression (2, 4). Anxiety and depressive disorders and alcohol abuse have been shown to be the most common psychiatric causes of sickness absence (5). In Norway the number of sickness days due to mental disorders quintupled between 1995 and 2000 (Eliassen HEH. Psykefraværet er femdoblet på fem år. Aftenposten 17.04.2000).

The etiology of anxiety and depressive disorders is multi-factorial. However, it is known that environmental factors, such as (negative) stress and adverse work conditions, are of importance (6-8). As in other Western countries, the Norwegian work life is going through considerable readjustments, representing both benefits and problems. The service sector continues to increase, at the cost of the primary and secondary industries. Simultaneously a

considerable rationalisation and increase of efficiency are seen in both private and public sectors. Occupations are changing, regarding content, conditions and status. Moreover, the female proportion of the work force has increased considerably the last decades (9). Anxiety and depressive disorders as well as sickness absence are more common in women than in men (10, 11).

Thus, it is known that

- Anxiety and depressive disorders cause a considerable and increasing sickness absence
- Work life readjustments have accelerated the last years
- Adverse job conditions may contribute to the development of anxiety and depression

Identification of anxio- and depressogenic factors in work life could lead to primary, secondary and tertiary preventative measures, potentially resulting in considerable financial gains. Considering the importance of these factors, little is known about the interplay between work environment and anxiety and depressive disorders.

Large population based studies on mental symptom load or disorder prevalence are few (12). Even fewer have included central work related information such as occupational and industrial classification and assessment of psychosocial work environment. As far as the author knows, no published study has examined whether occupational grouping, classified according to the International Standard Classification of Occupations (ISCO-88) (13), is a risk factor for anxiety and depression. Thus, in order to improve knowledge on work related risk factors for anxiety and depression, there is a need for large epidemiological studies that include information on anxiety and depression as well as on occupational grouping, psychosocial work environment and other work related information.

4.2 Epidemiology of anxiety and depressive disorders

4.2.1 Definitions and general aspects

Bouts of anxiety and periods of sadness are inherent aspects of human existence, mostly as appropriate reactions to physical or mental strain. Expressions of anxiety and depression which have abnormally long duration, come at inappropriate occasions, or cause considerable functional impairment are termed *symptoms*. Anxiety and depressive *disorders* are characterised by the combination, severity and duration of symptoms and signs, and by these symptoms leading to functional impairment (8, 14). *Subtreshold* disorders do not fill all the defined diagnostic criteria, but still cause clinically significant distress or impairment (15).

In psychiatry two major diagnostic classification systems are used worldwide, the International Classification of Diseases of the World Health Organization, currently in its 10th edition (ICD-10) (16, 17) and the Diagnostic and Statistical Manual of Mental Disorders of the American Psychiatric Association, currently in its 4th edition (DSM-IV) (14). Both are mainly categorical classification systems (9.1.2). The most influential epidemiological research in psychiatry has thus far been based on DSM criteria.

Prevalence estimates (PEs) from the two most influential cross-sectional studies are presented (Tables 1 - 2), namely the Epidemiologic Catchment Area Study (ECA) and the National Comorbidity Survey (NCS), both conducted in the United States. In addition, results from the Oslo study are included to show Norwegian PEs (18). The ECA Program (data collection ended 1983) encompassed an U.S. probability sample of about 3500 individuals at each of five sites (19). NCS (1990 - 1992) encompassed a probability sample of the U.S. population where 8098 respondents participated (10). In the Oslo study (1994 - 1997), 2066 subjects age 18-65 years, 57.5% of the original random sample, were interviewed (18). The differences in PEs between ECA and NCS illustrate the complexity of psychiatric epidemiology, and are, among other things, due to different diagnostic instruments and classification systems (the Diagnostic Interview Schedule, DIS, was made for ECA in order to identify cases meeting DSM-III criteria, while the Composite International Diagnostic Interview, CIDI, used in NCS, was based on DSM-III-R and ICD-10 criteria), different age groups (age 18 years and older in ECA, versus 15-54 years in NCS) and sampling procedures (ECA was a multi-site study, while NCS examined a nationally representative sample), and different criteria for defining caseness/different use of severity ratings for diagnostic decisions (8, 20-22). When reanalysed with application of data on clinical significance, the PEs of and the differences in PEs between ECA and NCS were considerably reduced (21). Corresponding revised US national PEs, made by selecting the lower estimate of the two surveys for each diagnostic category, are included in Tables 1 and 2.

CIDI was also used in the Oslo study, which showed PEs similar to those of NCS. Thus, the PEs of the Oslo study are probably overestimated. However, although translations of DIS and CIDI into many languages have enabled comparison of PEs between cultures (23), such comparisons should be interpreted with caution (22).

Table 1. Anxiety disorders[a] (lifetime and 12-month prevalence estimates in %): Revised US national estimates[b], the Epidemiologic Catchment Area Study (ECA), the National Comorbidity Survey (NCS) and the Oslo Study

| | Revised US national estimates (18-54 years) | ECA (18-54 years) | NCS (15-54 years) | | | | | | The Oslo Study (18-65 years) | | | | | |
| | 12-month | 12-month | Lifetime | | | 12-month | | | Lifetime | | | 12-month | | |
	Total	Total	Men	Women	Total	Men	Women	Total	Men	Women	Total	Men	Women	Total
Panic disorder	1.7	1.6	2.0	5.0	3.5	1.3	3.2	2.3	2.5	6.0	4.5	1.5	3.4	2.6
Agoraphobia	2.2	5.0	3.5	7.0	5.3	1.7	3.8	2.8	2.9	8.6	6.1	1.3	4.5	3.1
Specific phobia	4.4	8.5	6.7	15.7	11.3	4.4	13.2	8.8	8.0	19.5	14.4	6.1	15.1	11.1
Social phobia	3.7	2.0	11.1	15.5	13.3	6.6	9.1	7.9	9.3	17.2	13.7	4.5	11.1	7.9
OCD	2.4	2.3							0.7	2.3	1.6	0.3	1.0	0.7
GAD	2.8	2.7	3.6	6.6	5.1	2.0	4.3	3.1	2.4	6.1	4.5	0.9	2.7	1.9
PTSD	3.6							3.6						

[a]OCD: Obsessive-compulsive disorder; GAD: Generalised anxiety disorder; PTSD: Posttraumatic stress disorder.

[b]Based on reanalysis of the ECA and NCS data after applying criteria for clinical significance (21). The estimates were made by selecting the lower estimate of the two surveys for each diagnostic category.

Table 2. Major depressive disorder (MDD) and dysthymia [(lifetime (Lt) and 12-month (12 m) prevalence estimates in %]: Revised US national estimates[a], the Epidemiologic Catchment Area Study (ECA), the National Comorbidity Survey (NCS), the National Comorbidity Survey Replication (NCS-R) and the Oslo Study

	Revised US national estimates (18-54 years)		ECA (18 years or older)			NCS (15-54 years)				NCS-R (18 years or older)		The Oslo Study			
	MDD	Dysthymia	MDD		Dysthymia	MDD		Dysthymia		MDD		MDD		Dysthymia	
	12 m	12 m	Lt	12 m	Lt	Lt	12 m	Lt	12 m	Lt	12m	Lt	12 m	Lt	12 m
Men			2.6	1.4	2.2	11.0	6.1	4.8	2.1			9.9	4.1	5.9	2.3
Women			7.0	4.0	4.1	18.6	11.0	8.0	3.0			24.0	9.7	13.3	5.0
Total	4.5	1.6	4.9	2.7	3.2	14.9	8.6	6.4	2.5	16.2	6.6	17.8	7.3	10.0	3.8

[a]Based on reanalysis of the ECA and NCS data after applying criteria for clinical significance (21). The estimates were made by selecting the lower estimate of the two surveys for each diagnostic category.

4.2.2 Anxiety disorders

PEs for the most common anxiety disorders are shown in Table 1 (10, 18, 21, 24). The PEs for all the anxiety disorders were considerably higher in women, and tended to decrease with age. Low income (10), low education (10, 18) and living alone (18) were associated with increased prevalence. With the exception of generalised anxiety disorder, NCS showed substantially higher estimates than did ECA, mainly because of methodological differences (4.2.1).

4.2.3 Depressive disorders

PEs of major depression and dysthymia are shown in Table 2 (8, 10, 18, 25). The National Comorbidity Survey Replication (NCS-R, a nationally representative household survey of 9090 respondents ages 18 years or older, conducted 2001 – 2002) attempted to correct the overdiagnosing of major depressive disorder (MDD) in NCS, which was due to false positive assessment of dysphoria and anhedonia (25). This was done by requiring clinically significant distress or impairment, and by asking separate questions about symptom duration, in accordance with the revision of PEs by Narrow et al. (21). Concordance between CIDI and clinical reappraisal diagnoses in NCS-R was higher than in previous DIS and CIDI surveys (25).

In the Oslo study, women were about 2.5 times more likely than men to have a lifetime MDD. The prevalence of unipolar depression has consistently been found to be higher in women. This is consistent across cultures (8) and persistent over time (24). There appear to be real gender differences in willingness to seek treatment, propensity to be prescribed a medication, mechanisms of coping with depressed mood (8), and in depressive symptom profiles (26). Also, general population surveys have found that men report less symptoms (8) and to a larger extent deny or forget earlier depressive episodes (23). Immutable trait differences between the genders may contribute (8). However, probably none of these factors are of sufficient magnitude to explain the gender difference. According to Kessler (27), the higher prevalence in women is due to higher risk of first onset, and may be explained by the joint effects of biological vulnerabilities (sex hormones) and gender-related environmental provoking experiences.

Increased prevalence of depressive disorders with increasing age would be expected (greater probability of losses, such as close persons and physical function, and awareness of mortality) (8). Several studies have shown atypical and subthreshold depression to be more prevalent in the elderly compared to younger age groups (8, 25). However, ECA, NCS, NCS-

R and other studies have found the prevalence of major depression to be highest in the younger age groups and decrease with age, even after adjustment for gender, marital and socio-economic status. Explanations are many, and include age-related differences in recalling and/or reporting symptoms, differential willingness to disclose, cohort effects and instrument biases, as well as a real increase in the prevalence of depressive disorders in successive birth cohorts through the 20th century (8, 23-25, 27).

Various studies have shown increased prevalence of depression among single persons (8, 25), and in the Oslo Study, those who were married but did not live together were especially likely to have a lifetime affective disorder (18).

There is disagreement whether the associations between socioeconomic status and major depression are relatively weak (8, 10, 24) or rather strong (28, p. 399).

4.2.4 Comorbid anxiety and depressive disorders

Comorbidity refers to "the presence of more than one specific disorder in a person in a defined period of time" (29). Comorbidity may have different causes, for example that the one disorder predisposes to or somehow causes the other, or sharing of overlapping diagnostic criteria (30). Over one-half of patients in psychiatric treatment typically receive more than one diagnosis. Comorbidity in general, and comorbid anxiety and depressive disorders in particular, present substantial treatment problems and is often more severe, persistent and recurrent than pure mental disorders (31, 32).

Results from ECA and NCS show a considerable comorbidity between anxiety and depressive disorders [Table 3; odds ratios (ORs) greater than 1.0 means a positive association between the occurrences of the disorder pairs] (31). Only 22% of respondents with a lifetime history of major depression in NCS had pure depression, and only 19% of those with simple phobia had phobia only (31). The association between panic and depression was pronounced. In NCS-R, 59.2% and 57.5% of the respondents with lifetime and 12-month MDD, respectively, also met the criteria for at least one anxiety disorder. When comorbid with a depressive disorder, anxiety disorders have been found to usually be temporally prior to the depressive disorder (32). In NCS-R, anxiety disorders had onset before MDD in about 86% of the respondents. Chronic pervasive anxiety may lead to helplessness, and then to hopelessness, and finally to a depressive disorder (7).

Table 3. Comorbidity of anxiety and depressive disorders (based on lifetime and 6-month prevalence estimates) in the Epidemiologic Catchment Area Study (ECA) and the National Comorbidity Survey (NCS)[a]

		Lifetime comorbidity						6-month comorbidity					
		1.	2.	3.	4.	5.	6.	1.	2.	3.	4.	5.	6.
Affective disorders													
1. Depression		---						---					
2. Dysthymia	ECA	14.3						10.3					
	NCS	12.8						30.3					
Anxiety disorders													
3. OCD	ECA	6.4	4.5					9.3	3.3				
	NCS	---	---					---	---				
4. Phobia	ECA	3.5	3.1	5.2				5.6	2.4	7.6			
	NCS	4.1	3.0	---				6.4	4.4	---			
5. Panic disorder	ECA	12.7	8.0	11.6	4.9			21.3	5.3	19.7	8.3		
	NCS	6.6	4.8	---	10.8			14.4	12.2	---	18.1		
6. GAD	ECA	---	---	---	---	---		---	---	---	---	---	
	NCS	9.4	12.5	---	4.9	11.6		17.8	21.5	---	6.6	17.6	
7. PTSD	ECA	---	---	---	---	---	---	---	---	---	---	---	---
	NCS	5.2	4.9	---	3.3	3.8	3.8	7.1	7.4	---	4.1	8.0	7.5

[a]Adapted from Kessler RC (31). Coefficients in the table are zero-order odds ratios. ECA: Ages 18-54 years; NCS: Ages 15-54 years. OCD: Obsessive compulsive disorder; GAD: Generalised anxiety disorder; PTSD: Posttraumatic stress disorder.

4.3 Societal consequences of anxiety and depressive disorders

4.3.1 Sick-leave and reduced role functioning

Active anxiety disorders have been found to be associated with reduced work performance (33) and increased sickness absence (34).

A progressive gradient of depression symptom severity has been shown to be associated with a parallel gradient in the level of work impairment in a longitudinal study (35). Even a few depressive symptoms had a negative effect on work function. Conti and Burton (36) found that the average length of disability (including sick- leaves) and the disability relapse rate were greater for depressive disorders than for the comparison somatic groups diabetes mellitus, low back pain, heart disease and hypertension. The findings are congruous with results from The Medical Outcomes Study, which showed that both depressive disorders and sub-threshold depression equalled or exceeded common chronic somatic illnesses regarding functional impairment (37). The only chronic illness with role functioning worse than depression was advanced coronary artery disease (38). Kessler et al.

(25) found respondents with 12-month MDD to report a mean of 35.2 days during the past year when they were totally unable to work or carry out their normal activities because of their depression, compared to less than 15 days for most chronic conditions. Also the European DEPRES II study showed considerable absenteeism and role impairment due to depressive disorders (39). Subthreshold depression, which is considerably more frequent than depressive disorders, is also associated with increased sickness absence (40-42).

4.3.2 Macroeconomic costs

How to count the costs

[Most of this section has previously been published in Norwegian (43)]. The human capital theory states that "an individual's value to society is his or her production potential. The economic output lost due to illness is valued by earnings, assuming that in well-functioning markets the wage paid is equal to the value of the output produced" (44). The human capital approach, which forms the basis for the presented cost-of-illness analyses, does not account for contributions of non-labour market participants (3), and has repeatedly been criticised for the danger of substantially overestimating the magnitude of indirect costs (45). Estimation of costs is complex, involving a variety of methods and sources of data (4). Different estimates between studies are due to different choices as regards inclusion criteria, diagnostic criteria, sources of PEs, cost components included (the list of potential factors is long), and how to define and estimate each component. Often a mixture of different approaches is used, causing inconsistent calculations. The human capital approach and its limitations are more thoroughly described elsewhere (43, 46).

The most important cost components are defined in Table 4. *Direct cost* estimates are based on the prevalence of treated patients (mainly public statistics), and should, from a methodological perspective, involve "a fairly straightforward calculation" (3, 47). *Indirect costs* are based on PEs of the disorder/illness (48). *Other related costs* include important components such as family care giving (as in dementia) and costs due to crime (as in substance dependence disorder). No analyses claim to include all relevant cost factors. So-called transfer payments (e.g. disability payments and cash assistance) are not estimated, since in this case resources are not lost but transferred from one sector of society to another (48).

There is evidence that mental disorders are associated with increased general medical care utilisation, and that appropriate psychiatric health care reduces this utilisation. The

tradeoff of improving the psychiatric care is known as *the offset effect*, or *offset hypothesis* (44, 49).

Table 4[a]. Definition of the most important cost components

	Components	Definitions
	Direct costs	Resources used (medical care expenditures)
+	**Indirect costs**	Resources lost because of reduced production, consisting of two components:
	Mortality costs	Current monetary value of future output lost due to premature death
	Morbidity costs	The value of goods and services not produced due to the disorder, mainly due to excess sickness absence and lost productivity at work
+	**Other related costs**	Other costs due to the disorder
=	**Total costs**	

[a]Translated from Table 2, (43).

In presenting the economic burden of anxiety and depressive disorders, main emphasis will be put on the results of the two research teams which most extensively have analysed the costs of these disorders (by using a prevalence-based human capital approach), namely Rice & Miller (4, 50, 51) and Greenberg, Finkelstein & Berndt et al. (2, 3). Extensive national estimates corresponding to these American studies have not been performed in any European country as far as I know.

Anxiety disorders

Although anxiety disorders have the highest prevalence of mental disorders, much less research is done on anxiety than on depressive disorders, including in the area of costs (52). Table 5 shows that there are considerable differences between the two estimates of the costs of anxiety disorders as to the relative importance of the different components. This is due to differences in inclusion criteria and definition of components, as well as differences in sources of PEs (Rice & Miller's estimate was based on PEs from ECA, while Greenberg et al. used NCA data). Both teams suggest that their estimates are conservative, partly due to lack of information on various cost components.

The considerable non-psychiatric (direct) costs component in Greenberg et al.'s estimate is congruent with the very high help seeking frequency in sufferers of anxiety disorders (particularly panic disorder), both in the general medical and the specialised mental health system (34). Thus, adequate diagnosis and treatment of anxiety disorder may give a

considerable offset effect. The estimates of *morbidity costs* differ considerably between the two teams. Findings suggest that anxiety disorders decrease work performance (33) and increase both absenteeism and problems keeping the job (34).

Although Greenberg et al. used PEs from NCS (Table 1) for their estimate, a reasonable conclusion is that the groups' estimates of total costs probably are conservative.

Table 5. Economic costs of anxiety[a] and affective[b] disorders in the USA in 1990, in million USD (% of total costs)

Cost components	Anxiety disorders		Affective disorders	
	Rice & Miller (4)	Greenberg et al. (2)	Rice & Miller (51)	Greenberg et al. (3)
1. Direct costs	**10 748 (23.1)**	**37 050 (87.5)**	**19 215 (63.3)**	**12 412 (28.4)**
Service costs	6 849 (14.7)	36 290 (85.7)	12 456 (41.0)	11 237 (25.7)
-Psychiatric	6 849 (14.7)	13 263 (31.3)	12 456 (41.0)	11 237 (25.7)
Inpatient costs	5 848 (12.6)	10 043 (23.7)	9 238 (30.4)	8 345 (19.1)
Outpatient costs	1 001 (2.2)	1 770 (4.2)	3 218 (10.6)	2 792 (6.4)
Other	-	1 450 (3.4)[c]	-	100 (0.2)[d]
-Non-psychiatric	-	23 027 (54.4)	-	-
Drugs	1 167 (2.5)	760 (1.8)	406 (1.3)	1 175 (2.7)
Support costs	747 (1.6)[e]	-	1 480 (4.9)[e]	-
Mental health organisations	1 985 (4.3)	-	4 873 (16.0)	-
2. Indirect costs	**35 436 (76.1)**	**5 290 (12.5)**	**9 858 (32.5)**	**31 321 (71.6)**
Morbidity costs	34 161 (73.4)	4 117 (9.7)	2 195 (7.2)	23 800 (54.4)
-Excess absenteeism	-	507 (1.2)	-	11 700 (26.8)
-Lost productivity while at work	-	3 609 (8.5)	-	12 100 (27.6)
Mortality costs	1 275 (2.7)	1 174 (2.8)	7 663 (25.2)	7 521 (17.2)
3. Other related costs	**367 (0.8)**	**-**	**1 300 (4.3)**	**-**
4. Total costs	**46 551 (100)**	**42 341 (100)**	**30 373 (100,1)**	**43 733 (100)**

[a]*Rice & Miller* did not specify which anxiety disorders they included. *Greenberg et al.:* Panic disorder, posttraumatic stress disorder, agoraphobia, social phobia, simple phobia, and generalised anxiety disorder.

[b]Major depression, dysthymia and bipolar disorder.

[c]Expenses due to non-physician professionals.

[d]Mainly non-federal general hospitals and multi-service mental health organisations.

[e]Expenditures for research, training costs for physicians and nurses, programme administration etc.

Depressive disorders

Table 5 shows considerable differences between the two estimates, mainly due to the 11 times difference in *morbidity costs,* which is the most difficult component to estimate. Both teams

based their indirect cost estimates on PEs from ECA (Table 2). Several studies have shown considerable sickness absence and role impairment due to depressive disorders (4.3.1), thus giving support to the approach of Greenberg et al. Only suicide was included as a source of *mortality costs* in the two studies, an approach which can be questioned (53, 54). For example, depression is found to increase the mortality risk due to myocardial infarction (55).

Both teams omitted a number of relevant cost components due to methodological shortcomings and lack of data, and emphasised that their estimates are conservative. It is very likely that the real costs of depressive disorders in the U.S. in 1990 were at least as high as the lowest of the two estimates, i.e., comparable to the costs of somatic illnesses such as cancer, coronary heart disease or AIDS (56, 57). In addition, also sub-threshold and symptoms of depression are associated with considerable sickness absence, role impairment and a large medical service burden (4.3.1), (40).

In a recently published update, Greenberg et al. (58) found that the economic burden of depression in the U.S. rose by only 7% between 1990 and 2000, despite an increase of the treatment rate of more than 50%, partly due to a shift toward less costly forms of treatment. The increased treatment rate resulted in a 7% decrease in work place costs, while a higher employment rate increased these costs by 6%.

Is it possible to reduce the costs?

According to the referred studies, the societal costs of anxiety and depressive disorders are high, and of about the same magnitude. It is widely accepted that safe and effective treatments of most anxiety and depressive disorders exist (34, 44, 57), and that these disorders are under-diagnosed and under-treated (10, 25, 39, 52). However, research on approaches to cost reductions are scarce, particularly as regards anxiety disorders (52). Studies from general practice dominate, and the results disagree whether it is possible to make general practitioners more effective in diagnosing and treating depression (59, 60). Nevertheless, the results do suggest that morbidity cost savings of treatment will be large enough to approach, if not exceed, the direct costs of treatment, provided adequate collaboration between primary care and mental health care professionals (1). However, more research is needed in this field, and particularly in the workplace: Sickness absence and reduced capacity at work account for a considerable proportion of total costs. Thus, risk factors at work, and workers at risk for anxiety and depression should be identified, followed by randomised controlled studies on possible interventions such as job redesign.

4.4 Work life and negative affects (anxiety and depression)

4.4.1 Historical perspectives

The industrial revolution "swept away" the old small-scale shops of independent artisans and their craft guilds and unions, and craft groups were replaced by plentiful lower-skilled (previously agricultural) labour (61, pp. 18-30). With his *Principles of Scientific Management* (USA 1911), Frederick Taylor had a tremendous impact on the industrialisation process. He promised, through "scientific management", to increase the efficiency of industrial production. Central in his theory was to simplify workers' tasks into elemental skills and then reorganise them in minute detail. Physical labour was relieved by new machinery and reduced by elimination of wasted motions. However, work pace and total psychological work load increased substantially. The division of labour decreased the control over the work process and the variety of skills used. In addition, workers were isolated from each other and individually evaluated, to avoid "time-wasting" habits and resistance towards management plans. Although facing a considerable organised labour resistance, the methods of scientific management were almost universally accepted by major unions around 1950-60 in countries like the US and Sweden.

During the last decades the Western world has seen a shift from industrialisation towards an immense growth in the service sector. Globalisation of the economy has enforced this trend, with moving of industrial production to low-cost countries. While "taylorianism" still has a firm grip on industrial production in poorer parts of the world, its influence in rich countries is diminishing. However, the modern Western work force is facing the challenges of a "post industrial" era, characterised by knowledge intensive and service focused work (62, pp. 32 and 57-58). Tasks are complex, demanding both cognitive and social competence. Customers demand high quality products within short time limits. In addition, the increasing autonomy and flexibility may cause difficulties in delimiting work from family life.

Bernhardi Ramazzini (1633-1714) was one of the first to argue that there was a relationship between working life and work-related diseases (63). During the industrial era there was a growing interest in the relationship between physical work environment and health. From the beginning of the 20th century important research was carried out that prepared for a more holistic, biopsychosocial perspective on occupational health (63). The impact of psychosocially induced psychophysiological reactions (W. Cannon), the "stress" response (H. Selye), and evidence that a variety of bodily functions could be influenced by psychosocial factors (H.G. Wolff and S. Wolf) were important contributions. Others were the importance of control over a noxious situation for neuroendocrine reaction and for subsequent

morbidity and mortality (J.P. Henry and P.M. Stephens), and of social networks as modifiers of the stressor-stress-disease chain (J.S. House). Individual factors in the chain of pathogenetic events also came into focus, with "life changing events" like the death of a spouse or losing one's job (T.H. Holmes and R.H. Rahe), and Type A behaviour pattern in relation to cardiovascular events (R.H. Rosenman and M. Friedman).

In the early 1960s Einar Thorsrud and others pioneered the process of *industrial democratisation* in Norway (61, p. 4; 64, p. 225). New jobs and organisational structures were designed to release personal initiative and creativity and to reduce "alienation", by increasing control, variety of tasks and collaboration at work. However, not until the 1970s psychosocial work hazards became objects for occupational health research (61, p. 4).

4.4.2 Two leading theories on occupational stress

Stress is used to express both the stressor, the response and the result (62, p. 265). It may be defined as an alarm reaction in a self-governed, self-regulated system (65). Stress may be experienced as a positive challenge. But it can also cause strain. While most stress models focus on maintenance of homeostasis, strain is a disequilibrium mechanism, "an overload condition experienced by an organism's control system when it attempts to maintain integrated functioning in the face of too many environmental challenges" (61, p. 87). Thus strain is per se destructive.

Differences in negative affects between groups of workers could result from 1) a *selection into* specific jobs (certain personal characteristics may explain both occupational choice and levels of anxiety/depression), 2) a *selection out of* certain jobs (work conditions may cause exclusion of anxiety/depression prone individuals), and/or 3) a consequence of *'wear and tear'* (i.e., unfavorable conditions) in the job. The two models presented below are 'wear and tear' models.

The Job Demand-Control-Support (JDCS) model

(Most of the three first paragraphs in this section is included from paper IV, in order to make the presentation more readable.) The JDCS model has dominated research on occupational stress during the last 25 years (66). The model has principally been used in studies of cardiovascular health, but various other outcomes have also been examined, such as anxiety and depression. The JDCS model has three major components describing psychosocial work environment: (psychological) demands, (decision) latitude (or control) and (social) support. According to the Job Demand-Control (JDC) model, a high latitude will reduce stress and

increase learning, while high demands will increase both learning and stress. High demands combined with high latitude ('active' jobs) lead to increased learning, motivation and development of skills (66). According to the *strain hypothesis*, these 'active' workers, being exposed to high demands, will also experience psychological strain (61, pp. 31-36). However, because of high latitude, their strain level is predicted to be average. Also employees in 'passive' (i.e., low demands/low latitude) jobs will obtain intermediate scores. On the other hand, workers in 'high strain' jobs (high demands/low latitude) will experience the most adverse reactions of psychological strain (fatigue, anxiety, depression, and physical illness). Workers in 'low strain' jobs (low demands/high latitude) "are ... made both happier and healthier than average by work" (61, p. 36).

One of the most controversial issues of the strain hypothesis concerns whether the association between demands and latitude represents an additive effect or a (multiplicative) interaction (66-68). Regarding the latter, the literature sometimes postulates a synergistic effect, and sometimes a buffering effect (68). The *buffer hypothesis* states that a high latitude level (i.e., above a certain threshold) prevents demands from increasing the risk of illness (66, 68). The different operationalisations of the interaction hypothesis have been summarized by Landsbergis and Theorell (69), and are presented in paper IV.

In the 1980s social support was added to the Job Demand-Control model, resulting in the JDCS model (70). Correspondingly, the *iso-strain hypothesis* expands the strain hypothesis, predicting the most negative outcomes in jobs characterized by high strain combined with low support or social isolation ('iso-strain' jobs). The corresponding buffer hypothesis states that a support level above a certain threshold protects against the negative impact of high strain (66, 71).

While conclusions regarding the interaction/buffer hypotheses are still unsettled, the literature gives considerable support to the strain and iso-strain hypotheses (66). However, both model and methodological issues have been criticised (67, 68, 72, 73). One controversial issue is the concept of latitude, which is a combination of the theoretically distinct constructs skill discretion and decision authority (67, 68, 72). Another problem is the low sensitivity of the demands index to differences across occupations (68). These and various other limitations of the JDCS model have been summarised and discussed by Kristensen (67) and Kasl (68). A more recent problem facing the model is related to the development of information technology, which may reduce the number of low latitude jobs considerably. Thus the model may lose some of its current interest (62, pp. 272-273).

The Effort-Reward Imbalance (ERI) model

Siegrists fairly recent ERI model, another leading model within occupational stress, shifts the focus from control to reward (74). It was developed to 1) identify dimensions of stressful work experience that are typical for a wide variety of occupations, 2) identify work-related conditions that are likely to elicit recurrent, chronic stress, and 3) distinguish situation-specific versus person-specific components of stressful work experience (63). The basis of the model is the hypothesis that a misfit between high effort ("extrinsic", e.g., work pressure; "intrinsic", i.e., personal coping pattern such as need for control) and low reward (money; esteem; status control, e.g., lack of promotion prospects and job insecurity) causes a state of emotional distress with special propensity to autonomic arousal and associated strain reactions (63, 74). The model has been confirmed in longitudinal studies for the prediction of cardiovascular disease (74, 75).

A comparison of the JDCS and ERI models

The two models have considerable similarities (Table 6). The ERI model includes both the demands and the control aspects. However, it covers a broader social context than does the JDCS model (68), and includes additional elements of obvious importance to modern workers' well-being, thus complementing the JDCS model, and possibly increasing its relevance at the cost of the JDCS model. Nevertheless, the (apparent) simplicity of the JDCS model, although criticised (67), will probably continue to contribute to its popularity.

Table 6. A comparison of the Job Demand-Control-Support (JDCS) and Effort-Reward Imbalance (ERI) models

	JDCS model	**ERI model**
Problem source	Job environment (adverse combinations of demands, latitude and support)	Mainly job environment (imbalance between effort and reward)
Factors' source	Job environment	Job environment and person
Factors	• demands	• high effort -extrinsic, e.g., work pressure -intrinsic, e.g., need for control
	• decision latitude (control) • social support	
		• reward
Primary consequences	strain	
Secondary consequences	somatic and mental health problems	

4.4.3 Literature review

Kessler & Frank (5) compared PEs of anxiety and depressive disorders between 16 subgroups from five different "occupational clusters" in a sample of 4091 workers from NCS (4.2.1). Some of the professional, managerial-administrative and crafts subgroups had lower than average PEs of anxiety and/or depressive disorders, while some clerical, sales and blue collar groups had high PEs of these disorders. Two other epidemiological studies showed congruous results (76, 77). Roberts & Lee (78) examined the occupational distribution of MDD in a sample of 8592 workers from ECA (4.2.1), and found the 132 'farming, fishing, forestry' workers to have the highest lifetime risk for major depression of all occupational groups. Others have shown that farmers have increased suicide rates (79, 80), and presumably anxiety and/or depressive disorders could be the background. The ECA study showed that the lifetime prevalence of any mental disorder in men was higher among "unskilled" than among those "skilled" or with "higher occupational status" (81). However, none of the five large North American studies that have examined occupational differences in levels/PEs of (anxiety and/or) depression (5, 76-78, 82) have used the ISCO-88 classification (13), whose structure is mainly based on differences in skill level (7.3.1).

Some of the associations between negative affects and work life may be explained by physical environmental factors such as exposure to organic solvents (83), neurotoxic substances (lead, cyanide, carbon monoxide and mercury) (84) and organophosphates (in insecticides) (85, 86). However, psychosocial working conditions have greater explanatory power. Some single factors are associated with negative mental health effects such as anxiety and depression, including long work hours (87, 88), threat of job loss (61), and economic stress, which is one of the major predictors of psychiatric morbidity and suicide (89, 90). Nevertheless, most of the relevant literature concerns the examination of combinations of factors that from a theoretical perspective may represent occupational stress, and as such are risk factors for negative affects.

A number of studies have tested the JDCS model in relation to psychological well-being and distress, but few of these have used depression, and even fewer anxiety, as outcome variables (66). Pelfrene et al. (71) tested the JDCS model with self-reported "feelings of depression" as outcome, in a non-representative sample of 21 419 Belgian workers aged 35-59 years. They found increasing depression symptom loads with increasing demands and decreasing latitude and support scores. Corresponding associations have been confirmed in longitudinal studies for both anxiety and depression levels/caseness (91-94). In the longitudinal Whitehall II Study, work characteristics, including skill discretion and decision

authority, explained most of the socioeconomic status gradient in depression in men (92). Pelfrene et al. (71) found support to be the subscale most strongly associated with depression. The associations between psychosocial work environment and negative affects do not seem to be explainable by differences in socioeconomic status (SES) (61, p. 42; 95) or personality traits (94).

The BELSTRESS study confirmed the strain hypothesis as regards depressive feelings (71), in agreement with the majority of cross-sectional studies examining either male or mixed gender samples related to psychological well-being and distress (66). The iso-strain hypothesis, which has been confirmed in only about half of such studies (66), was also confirmed in BELSTRESS (71). The strain hypothesis has recently been confirmed in longitudinal studies in relation to depressive symptoms (96, 97).

Different interpretations of the postulated interactions between demands and latitude, and between job strain and support, have led to different operationalisations of the interaction hypotheses (69). No study, known to the author, has systematically examined these operationalisations with anxiety and depression as outcomes. Few studies that have tested the JDC(S) model with psychological distress as outcome have found significant (multiplicative) interactions, and even fewer have demonstrated buffer effects (66).

Apart from the Job Content Questionnaire (JCQ), the most widely used self-report measure of the JDCS model is the Swedish Demand-Control-Support Questionnaire (DCSQ) (98). However, the only systematic examination of the psychometric properties of DCSQ was done as part of 'The Stockholm Survey 1', where reliability and validity mainly were examined in a group of 30 physician's secretaries (99).

Studies testing the ERI model with anxiety and depression as outcomes are scarce. However, associations have been shown between effort-reward imbalance and depressive symptoms (100), job burnout (101) and well-being (102). The latter study, combining information from the JDCS and ERI models, showed independent cumulative effects of the models on employee well-being (102).

5 Aims

The main aim of this dissertation was to examine possible associations between negative affects, measured by the Hospital Anxiety and Depression Scale (HADS), and work life in a large Norwegian population-based sample. The more specific aims included were:

1) To examine whether and why certain occupational groups have increased risk for anxiety and depression (papers I and II).

Adverse job conditions may affect the development of anxiety and depressive symptoms (61, 74, 103, 104). Thus the working place may be a strategic arena for interventions against anxiety and depression. However, knowledge about populations at risk is yet too scarce to develop targeted interventions (5). One way of identifying groups at risk is to study possible differences in anxiety and depression between occupational groups. Published studies on the issue are few, have important short-comings, and none have been conducted outside of North America. The aim of the first study was therefore to examine levels of anxiety and depression in relation to Standard Classification of Occupations, ISCO-88 (105), which to my knowledge has not been previously published.

The aim of the second study was to further investigate findings from the first, by examining in more detail one of the occupational groups with the highest risk for anxiety and depression. Thus the aim was to examine farming as an occupation with a high risk for anxiety and depression. Studies of the relationship between farming and negative affects, particularly anxiety, are scarce. The study size, particularly the number of female farmers, and comparison between full-time and part-time farmers were unique to the study.

2) To examine the psychometric properties of the DCSQ questionnaire (paper III).

Psychometric properties of the DCSQ has not been examined earlier in a large population, neither for the Swedish nor the Norwegian version. The factor structure, inter-correlation, homogeneity of subscales and internal consistency of the Norwegian translation of DCSQ were examined.

3) To examine whether adverse psychosocial work environment is a risk factor for anxiety and depression (paper IV).

Few studies have tested the central hypotheses of the JDCS model with anxiety and depression as outcome variables in population-based samples (66). This particularly concerns systematic examinations of the different operationalisations of the postulated interactions (69).

6. Materials

6.1 The national health screenings

In the 1940s a nation-wide, systematic screening programme for tuberculosis was realised in Norway. A central governmental screening organisation was established, the National Health Screening Service (Statens helseundersøkelser, SHUS) (106). Their mobile teams covered the entire country. Over the years, as the problem of tuberculosis decreased, the awareness of the potentials for cardiovascular disease prevention increased. From 1985 onwards SHUS paid regular visits to all municipalities, county by county, every third year. At each visit, all residents aged 40-42 were invited to a screening for cardiovascular disease risk factors. The aims included monitoring of risk factors, epidemiological research and preventative measures. Since 1994 new topics have been added, such as musculo-skeletal complaints and psycho-social problems (106).

The health screenings cover considerable geographic areas and produce large and representative samples. Aspects of disease, risk and protective factors, lifestyle and laboratory measures are examined. The health screenings have identified considerable regional variations in a number of important aspects of health, and made it possible to examine how the different health variables are associated with and influence each other. The inclusion of information on psychiatric symptomatology, such as anxiety and depressive symptoms, represents new and unique opportunities for psychiatric epidemiological research.

6.2 The Hordaland Health Study 1997-99 (HUSK)

6.2.1 Study area

Hordaland County is situated at the west coast of Norway. The population is approximately 420 000 (about 9% of the population of Norway), and about 50% of the inhabitants live in the city of Bergen. Geographically and demographically Hordaland is a "Norway in miniature", with a rather small population scattered over a large area, and a considerable proportion living in towns and small villages. The occupational distribution of the work force does not differ substantially from the rest of the country, with the exception of oil based industry, which is more important in Hordaland than in most other counties (Statistics Norway 2004).

6.2.2 Study population

HUSK was conducted as a collaboration between the National Health Screening Service, the University of Bergen and local health services. The study population included the 29 400

individuals (15 051 men and 14 349 women) born between 1953 and 1957 who resided in Hordaland county on 31 December 1997. A total of 18 581 (8598 men and 9983 women) participated, yielding participation rates of 57 % for men and 70 % for women. HUSK also included a sample of 4849 individuals (2291 men and 2558 women) born 1950-51 who had participated in an earlier study conducted 1992-1993. From this cohort 3733 persons (73% or 1664 of the men, and 81% or 2069 of the women) participated. Thus, a total of 22 314 (65.2%) of those invited participated in the study.

Data collection in HUSK was performed in two steps. The first step, which was identical for all participants, included a self-administered questionnaire (SAQ) and a health examination. In the second step, the participants were given one of five different SAQs: The 1953-57 cohort was given gender-specific questionnaires. In addition, each gender was divided into two groups (by odd or even day of birth) and given different questionnaires. A major part of these four questionnaires was identical. However, DCSQ was included in only two of the four versions, namely in one of the versions for each gender. From the 28th of April 1998 and onwards both female sub-samples of the 1953-57 cohort were given identical questionnaires, because of the need to get more responses to a certain set of questions (unrelated to DCSQ). Thus, DCSQ was distributed to all participating women from the 1953-57 cohort after this date. DCSQ was not included in the fifth questionnaire II, which was given to the 1950-51 cohort, and which differed substantially from the other four versions.

Participants from Bergen, Askøy and Odda received questionnaires in bokmål, while the questionnaires of the participants from the other municipalities were in nynorsk.

6.2.3 Variable overview and inclusion criteria

The variables included in studies I - IV are shown in Table 7, and are further explained in 7.2 - 7.4. The questionnaires were scanned, and the responses to the open-ended questions of main occupation and industry were manually classified. For all the four studies in the dissertation, general inclusion criteria were 1) valid HADS scores and 2) having worked at least 100 income giving hours the preceding year.

6.2.4 Person protection and ethics

The study protocol was cleared by the Regional Committee for Medical Research Ethics of Western Norway and approved by the Norwegian Data Inspectorate. The analyses were carried out on anonymized data files.

Table 7. Overview of HUSK variables included in studies I - IV

Variables/indexes (number of items)	Questionnaire[a]	Number of valid scores[b] Men	Women
		Men	**Women**
Anxiety and depression			
Hospital Anxiety and Depression Scale (HADS) (14)	II, all	8522	10468
HADS anxiety score (HADS-A) (7)	II, all		
HADS depression score (HADS-D) (7)	II, all		
Work related variables			
Occupational grouping	I	8074	9198
Industrial grouping	I	7205	8275
Farmer, full- or part-time	I	7458	8652
Demand-Control-Support Questionnaire (DCSQ) (17)	II, half of 1953-57	3104	4367
Psychological demands (5)	II, half of 1953-57	3167	4458
Decision latitude (6)	II, half of 1953-57	3171	4473
Social support (6)	II, half of 1953-57	3112	4399
Number of paid work hours per week	II, 1953-57	6765	7806
Shift work, night work or duties	II, 1953-57	6946	8115
Often opportunity to use one's abilities at work	II, 1953-57	6840	7945
Level of physical activity at work	II, 1953-57	6490	7565
Demographics			
Level of education	I	8522	10468
Annual household income (Norwegian kroner)	II, all	8344	9949
Marital status	I	8522	10468
Parity	I	8522	10468
Individual lifestyle			
Daily smoking	I	8522	10468
Alcohol consumption	I	8522	10468
Leisure time physical activity	I	8461	10355
Body mass index (BMI)[c]	I	8518	10444
Perception of having enough good friends	II, all	8522	10468
Somatic problems			
Musculo-skeletal problems	I	8442	10277
Chronic somatic diseases	I	8522	10468
SF-12 physical composite score	I	7832	9201

[a]I: The HUSK step I questionnaire, identical for all participants. II: The step II questionnaires. 'All': Included in all five versions; '1953-57': Included in all four of the versions given to the 1953-57 cohort.

[b]Only participants with valid HADS scores were included.

[c]Weight in kg/height in m^2, calculated from measured height and weight.

6.2.5 Financing

This project has been financed with the aid of EXTRA funds from the Norwegian Foundation for Health and Rehabilitation and the National Council of Mental Health, and with funds from the Norwegian Ministry of Labor and Government Administration.

7. Methods

7.1 Study design

The large population based HUSK study was the first SHUS survey in Hordaland to include recognised instruments for assessing anxiety and depressive symptomatology (HADS) and psychosocial work environment (DCSQ). Therefore, all the presented studies are cross-sectional. Anxiety and depression (levels and caseness) measured by HADS were outcome variables in studies I, II and IV.

7.2 Assessment of anxiety and depression: The Hospital Anxiety and Depression Scale (HADS)

Levels of anxiety and depression were assessed by the self-administered questionnaire HADS, which represents a dimensional approach to measuring anxiety and depression (Table 8). HADS was administered in the second step of HUSK, and was included in all the five versions of questionnaire II. HADS has been found to perform well in assessing symptom load and caseness of anxiety and depressive disorders in both somatic, psychiatric and primary care patients as well as in the general population (107). The anxiety subscale (HADS-A) particularly covers chronic tension, restlessness and worry, as in geneneralised anxiety disorder, and includes one item on panic attacks. The depression subscale (HADS-D) especially taps anhedonia (reduced pleasure response). In addition, items on psychomotor retardation and depressed mood are included.

Valid HADS scores were defined as having answered at least five of seven items on both the anxiety (HADS-A) and the depression (HADS-D) subscales. Each item was scored on a four-point scale from zero to three , and the item scores were added, giving subscale scores from zero (minimum symptom level) to 21 (maximum symptom level). The scores of those who filled in five or six items were based on the sum of completed items multiplied with 7/5 or 7/6, respectively. The number of valid HADS scores was 18 990, corresponding to 85.1% of the respondents and 55.4% of the invited.

Table 8. The Hospital Anxiety and Depression Scale (HADS)[a]

Item number	Subscale[b]	Item text
1	HADS-A	I feel tense or wound up
2	HADS-D	I still enjoy the things I used to enjoy
3	HADS-A	I get a sort of frightened feeling as if something awful is about to happen
4	HADS-D	I can laugh and see the funny side of things
5	HADS-A	Worrying thoughts go through my mind
6	HADS-D	I feel cheerful
7	HADS-A	I can sit at ease and feel relaxed
8	HADS-D	I feel as if I am slowed down
9	HADS-A	I get a sort of frightened feeling like 'butterflies' in the stomach
10	HADS-D	I have lost interest in my appearance
11	HADS-A	I feel restless as if I have to be on the move
12	HADS-D	I look forward with enjoyment to things
13	HADS-A	I get sudden feelings of panic
14	HADS-D	I can enjoy a good book or TV programme

[a]Questions are answered on a four-point scale from 0 to 3. Items 2, 4, 6, 7, 12 and 14 are reversed before summation.

[b]HADS-A: Anxiety subscale; HADS-D: Depression subscale.

Caseness (i.e., 'possible cases' of HADS-defined anxiety and/or depressive disorders) was defined as a score of eight or above on HADS-A and/or HADS-D, as this cut-off level has been shown to give an optimal balance between sensitivity and specificity on receiver operating curves (107).

7.3 Assessment of working conditions

7.3.1 Occupational and industrial grouping

The open-ended question of main occupation, included in the first step of HUSK, was classified according to Standard Classification of Occupations, ISCO-88 (13, 105). The ISCO-88 has a four-level hierarchical structure, and is divided into 10 major (e.g., 'professionals'), 31 sub-major (e.g., 'life science and health professionals'), 108 minor (e.g., 'health professionals') and 353 unit groups (e.g., 'nutritionists'). Classification is done according to two principles: 1) s*kill level*, i.e., which technical and formal skills that are normally required (achieved through formal education or informal training and experience). The four levels of skills are occupations that normally require primary education, secondary education, one to three years at university/college, and first/postgraduate university degree, respectively. For the 10 major occupational groups (MOGs), the skill level is decreasing from

group 1 through group 9; and 2) s*kill specialisation*, defined by the field of knowledge required, the tools/machinery used, the materials worked on or with, and the types of goods and services produced.

The open-ended question of main industry was classified according to Standard Industrial Classification, SIC94 (108). Industrial classification entails grouping homogenous activities as much as possible, i.e., classifying production units according to their economic activity. SIC94, being independent of the ISCO-88, has a six-level hierarchical structure, and is divided into 17 sections, 31 subsections, 60 divisions, 222 groups, 503 classes and 658 subclasses.

An additional question (relevant for paper II) specifically asked whether the participants were farmers, "full-time or part-time". This enabled the categorisation of participants into *full-time* farmers (having farming as their main occupation), *part-time* farmers (having their main work outside of the farm and farming as part time job) and *non-farmers* (neither full- nor part-time farmers). Part-time farmers included individuals presumably running a farm, or working on a farm, as well as farmers' spouses who contributed to the work on the farm.

7.3.2 The Swedish Demand-Control-Support Questionnaire (DCSQ)

In HUSK, psychosocial work environment was assessed by DCSQ (Table 9, which is identical to Table 1 in papers III and IV, is included to make the text more readable). This 17 item questionnaire was developed by Theorell et al., based on the JDC(-S) Model (61, 70, 98, 109). The instrument covers (psychological) demands, (decision) latitude (or control), and (social) support in the work place. The demands and latitude subscales represent a shortened and modified version of Karasek's Job Content Questionnaire (69, 110). The support items are oriented toward the atmosphere at the work-site.

Because of a translation error from Swedish into Norwegian, one of the latitude/skill discretion items had to be excluded ('Does your work require skills?'). The latitude index consists of four items on intellectual discretion (skill discretion) and two items on authority over decisions. A distinction between skill discretion and decision authority in samples characterised by a heterogeneous set of occupations is not indicated, since these subscales correlate highly (111).

Table 9. The Swedish Demand-Control-Support Questionnaire (DCSQ)[a]

Item number	Item text
Psychological demands (D)	
D1	Does your job require you to work very fast?
D2	Does your job require you to work very hard?
D3	Does your job require a too great work effort?
D4	Do you have sufficient time for all your work tasks?
D5	Do conflicting demands often occur in your work?
Decision latitude (L)[b]	
L1/SD1	Do you have the opportunity to learn new things in your work?
L2/SD2	Does your job require creativity?
L3/SD3	Does your job require doing the same tasks over and over again?
L4/DA1	Do you have the possibility to decide for yourself *how* to carry out your work?
L5/DA2	Do you have the possibility to decide for yourself *what* should be done in your work?
Social support (S)[c]	
S1	There is a quiet and pleasant atmosphere at my place of work.
S2	There is good collegiality at work.
S3	My co-workers (colleagues) are there for me (support me).
S4	People at work understand that I may have a "bad" day.
S5	I get along well with my supervisors.
S6	I get along well with my co-workers.

[a]The table is identical to Table 1, papers III and IV. The translation into English from the Norwegian version was done by the authors, and is not authorised. Questions are answered on a four-point scale from 1 to 4. All item scores except D4 and L3 are reversed before summation.

[b]Decision latitude: Control. SD: Skill discretion; DA: Decision authority. The latitude/skill discretion item "Does your job require skills?", was excluded from the study due to a translation error.

[c]A combination of supervisor and co-worker support.

DCSQ uses a frequency-based grading for demands and latitude items, and an intensity-based grading for support items. Each item is scored on a four-point scale from one to four, and the item scores are added, giving subscale scores from 5 (minimum level) to 20 (maximum level) for demands, and from 6 to 24 for support. Because of the excluded latitude item, latitude scores were multiplied with 6/5, giving scores from 6 to 24. Valid scores were defined as having answered at least three of five items on the demands and latitude subscales and at least four of six items on the support subscale. The scores of those who filled in three or four items on the demands and latitude subscales were based on the sum of completed demands items multiplied with 5/3 or 5/4, respectively, and the sum of completed latitude items multiplied with 6/3 and 6/4, respectively. Correspondingly, the scores of those who

filled in four or five items on the support subscale were based on the sum of completed items multiplied with 6/4 or 6/5, respectively.

7.3.3 Other work related variables

The following work related variables were included due to their possible confounding effects on the associations between HADS levels/caseness and the independent variable(-s): Number of paid work hours per week (less than 20 / 20-50 / more than 50); shift work, night work or duties (yes / no); level of physical activity at work (mainly sedentary / work demanding much walking with or without much lifting / heavy manual labor); and opportunity to use one's abilities at work (seldom / sometimes or often).

7.4 Demographics, individual lifestyle and somatic health problems

The following possible confounders were included: Level of education [less than A-levels or high school / (equivalent to) A-levels or high school / college or university], the household's total income in Norwegian kroner (less than 200000 / 200000-500000 / more than 500000; in EUR: less than 24067 / 24067-60168 / more than 60168), marital status [unmarried / married, registered partner / widow (-er), divorced or separated], child(-ren) (yes / no), daily smoking (yes / no), alcohol consumption (alcohol units per fortnight, categorized into total abstinence / low-risk consumption / high-risk consumption, the latter defined as consumption above 21 units per week for men and 14 units per week for women), leisure time physical activity [categorized into three groups: 1-2 points / 3-5 points / 6-8 points, using a scale from 1 point (no exercise) to 8 points (three or more hours per week of both heavy and light exercise)], perception of having 'enough good friends' (yes / no), musculo-skeletal problems (pain and/or stiffness of at least 3 months duration the last 12 months, resulting in reduced work capacity or sick leave), chronic somatic diseases (having or having had myocardial infarction, angina pectoris, hypertension, stroke, asthma, chronic bronchitis, diabetes mellitus or multiple sclerosis) and the physical composite score (PSC) of the quality-of-life scale SF-12 Health Survey (z-transformed norm score for physical health is 50. The higher score, the better is the reported physical health) (112). PCS was trichotomized (1st quartile / 2nd - 3rd quartile / 4th quartile). Body mass index (BMI, weight in kg/height in m^2) was calculated from measured height and weight, and trichotomized (lower than 22.8 / 22.8-27.4 / higher than 27.4).

7.5 Statistical methods

7.5.1 Common statistical procedures

In studies I, II and IV all analyses were stratified by gender. In studies I and II stratification was done because HADS-A and HADS-D scores as well as the distribution of occupations differed considerably between men and women. In study IV the main reason for stratification was the significant interactions between gender and demands, strain and iso-strain, respectively, regarding anxiety and depression levels (and caseness). In the first two studies univariate analyses of variance (ANOVA) were used to test the hypotheses of no differences in mean HADS scores between groups. When heteroscedasticity (unequal variances) occurred, the analyses were repeated using the non-parametric Kruskal-Wallis test.

Crosstabulations and χ^2-test/Fisher's exact test were used to examine possible differences between groups, regarding eventual confounders and in prevalence of anxiety and depressive disorders. Possible differences in anxiety and depression caseness were also examined by logistic regression.

In the two first studies, ANOVA analyses were used to adjust HADS-A and HADS-D scores for possible confounders, which were tested in bivariate analyses. The variables whose categories differed significantly both across the categories of the independent variables (crosstables) and in HADS-A and/or HADS-D scores (one-way ANOVA) were included. Two-way ANOVA was primarily used. For the differences in HADS scores that could not be explained by a single variable, different models were made for the simultaneous adjustment of several explanatory factors. The models were based on themes ('work related', 'demographics', 'individual lifestyle' and 'somatic health problems'), the different variables' explained variance (in one-way ANOVA with the corresponding HADS score as the dependent variable) and on variables that differed most between the groups (crosstables).

In the fourth study, possible confounders of the associations between DCSQ indexes and HADS scores were adjusted for in linear regression.

All HADS and DCSQ index scores throughout the papers refer to *mean* scores for the current groups. Significance level was set to $p = 0.05$ with two-sided tests. The analyses were performed by means of SPSS for Windows, version 11.0, S-PLUS, version 6.1 and Microsoft Excel 97.

7.5.2 Particulars for the different papers

Paper I

Occupational (and industrial) groups that statistically differed significantly from the average HADS scores were focused upon. Groups with *'higher'* HADS-A and HADS-D scores filled the following criterion: The lower limit of the 95% confidence interval of the mean HADS sub-score was higher than the mean HADS sub-score of the corresponding total sample. Correspondingly, the higher limit of the 95% confidence interval of *'lower'* score groups were lower than the mean HADS sub-score of the corresponding total sample. To prevent Type 1 errors due to multiple comparisons, post hoc tests were performed: When homoscedasticity occurred, Scheffé's test was used, while Tamhane's T2 test was done when heteroscedasticity occurred.

Paper III

Different sets of principal component analyses (PCA) were performed on the demands, latitude and support subscales, with varying criteria for the number of factors. The results from oblique rotation (Oblimin) were reported, since this is the preferable method (111, 113-115). However, analyses with orthogonal rotation (Varimax) were also performed. In order to test the stability of the factor structure obtained, the analyses were repeated according to gender and skill level, and in randomly split halves of the sample.

Pearson's correlation coefficients were calculated and squared for estimation of the subscales' shared variance. The internal consistency of the subscales was calculated by Cronbach's coefficient α.

Some 50% of the men and 75% of the women that participated in the first step of HUSK were given DCSQ. Thus weighting was performed to approximate the gender distribution of the participants of the second step to the gender distribution of the participants of the first step.

Paper IV

The continuous variables strain (demands divided by latitude) and iso-strain (strain divided by support) were constructed. Assessment of the associations between the DCSQ indexes and HADS scores was done by means of standardized regression coefficients (SRCs), adjusted explained variances (R^2s) and Generalised Additive Model (GAM) curves (116). The

corresponding associations with caseness of anxiety and depressive disorders were examined by means of odds ratios (ORs) from logistic regression analyses and GAM curves.

Possible interactions between demands and latitude, and between strain and support, were examined as follows (69): 1) Examination of the associations between anxiety and depression and the continuous variables strain and iso-strain. 2) Different combinations of demands - latitude and strain - support, respectively, were examined after dichotomization and trichotomization of the variables. The corresponding cells were then compared for HADS levels (and caseness). 3) Assessment of the significance levels of the multiplicative interaction terms demands x latitude and strain x support, after dichotomization of the variables (HADS levels: ANOVA; caseness: logistic regression) (117).

(Significant) moderator effects of gender on the associations between DCSQ indexes and anxiety and depression levels (and caseness) were defined by p-values less than 0.05 for the interaction term gender x DCSQ index, both variables dichotomized (ANOVA/logistic regression) (117).

8. Results

8.1 Main findings and general patterns

Anxiety and depression levels/caseness showed a distinct and inverse association with skill levels, most strongly observed for depression in men (paper I). Workers in elementary occupations and farming were found to be at risk for anxiety and depression. Male farmers had the highest depression level of all occupational groups. The higher than average levels of negative affects in male full-time farmers were explained by adverse working conditions and low income (paper II). The psychometric properties of DCSQ were found to be satisfactory (paper III). Perceived high psychological demands, low decision latitude and low social support, separately and particularly combined, were strong risk factors for anxiety and depression (paper IV). The associations between psychosocial work environment and negative affects were not explained by other factors.

Generally, the associations with psychosocial work environment were similar for anxiety and depression, while depression showed a stronger association with occupational grouping than did anxiety. Examination of HADS levels and HADS defined caseness consistently showed the same patterns.

Women had significantly higher anxiety symptom levels than men, while the reverse

was seen for depression levels. The associations between negative affects and occupational grouping/adverse working conditions were generally stronger in men compared to women. For most of the possible cofounders there were significant differences between the genders. Men were more evenly distributed throughout the occupational classification system than women. Both males and females showed a clear tendency towards a traditional gender pattern in the distribution of occupations.

8.2 Synopsis of the results of papers I - IV

8.2.1 Paper I

The study encompassed the 17 384 workers who had given occupation, i.e. 85.7% of all working participants. However, when adjusting for possible confounders, the analyses were carried out without those born 1950-51, because they did not have valid information on all variables. The DCSQ subscales were not adjusted for, because of the relatively low number of valid responses (Table 7). The sub-sample of 11 910 individuals which was used, did not differ significantly from the main sample as to the HADS scores, and showed a similar, though slightly weaker association with skill level.

Main results and conclusions are summarized in Table 10 [adapted from Table 1 in paper I (118)]. 'Elementary occupations' consistently showed higher than average anxiety and depression levels, while male agricultural workers had the highest depression levels of all occupational groups.

8.2.2 Paper II

The study encompassed 17 295 employed participants, including 917 farmers, of whom 330 (204 men and 126 women) were full-time and 587 (369 men and 218 women) were part-time farmers. However, when adjusting for possible confounders, the analyses were carried out without those born 1950-51, because they did not have valid information on all variables. The sub-sample of 11 134 individuals which was used, did not differ significantly from the main sample as to the HADS scores.

Table 10[a]. Overview of the examination of HADS[b] scores in occupational groups in The Hordaland Health Study: Statistical procedures[c], results and conclusions

| | | Results from the examination of major occupational groups (MOGs) | | | |
| | | Men | | Women | |
Testing of assumptions	**Procedures**	**HADS-A**	**HADS-D**	**HADS-A**	**HADS-D**
HADS scores are normally distributed	Skewness, total (range)	0.88 (0.68–1.00)	1.12 (0.30-1.25)	0.80 (0.51-1.07)	1.38 (1.03-1.70)
The MOGs have equal variances	Levene's test of equality of variances	No	No	Yes	No
Research questions					
Do HADS scores differ between MOGs?	One-way ANOVA	Yes	Yes	Yes	Yes
	Kruskal-Wallis test	Yes	Yes		Yes
Which MOGs differ from the average level?	Comparison of means and 95% confidence intervals	MOGs 0, 3 and 9	MOGs 1-3 and 6-9	MOG 9	MOGs 1 and 9
Which MOGs differ from which?	Post hoc tests (pairwise multiple comparisons)	None (Tamhane's T2 test)	Several (Tamhane's T2 test)	None (Scheffé's test)	MOG 9 from MOGs 1-5 (Tamhane's T2 test)
Do the MOGs differ regarding caseness[b]? How?	Logistic regression	No	Yes, MOGs 4-9 from MOG 1	Yes, MOG 9 from MOG 1	Yes, MOGs 6-9 from MOG 1
How strongly is occupation associated with HADS scores?	Explained variance (R^2) from one-way ANOVA	0.4%	1.8% (2x the R^2 of education)	0.3%	0.5%
Can differences in HADS scores between MOGs be explained by other variables?	(Two-, four- and six-way) ANOVA	Partially by 'household income' (p=0.046)	No	'How often are you able to use your abilities in your work?'	'How often are you able to use your abilities in your work?'
Conclusive questions	**Basis for conclusions**	**Conclusions**			
Are there certain patterns in the relationship between HADS scores and occupations?	-The above findings -Examination of sub-major occupational groups and industrial sections/divisions	HADS scores are clearly and inversely associated with skill levels. Strength of the association: Moderate	Strong	Weak	Strong to moderate
Are the findings of *clinical* significance?	The study as a whole	No	Probably	No	Possibly

[a]Adapted from Table 1 in paper I (118)

[b]Hospital Anxiety and Depression Scale; HADS-A: Anxiety score; HADS-D: Depression score. 'Possible cases': HADS-A or HADS-D score >= 8.

[c]Significance level: P = 0.05 with two-sided tests.

Table 11. Characteristics of farmers and non-farmers in The Hordaland Health Study

Variables/categories		Men				Women			
		Full-time farmers	Part-time farmers	All farmers	Non-farmers	Full-time farmers	Part-time farmers	All farmers	Non-farmers
HADS-A mean score (95% confidence interval)[a]		4.8	4.9	4.8	4.3	4.9	5.1	5.0	4.8
		(4.4-5.2)	(4.5-5.2)	(4.6-5.1)	(4.2-4.4)	(4.2-5.5)	(4.6-5.5)	(4.6-5.4)	(4.7-4.8)
HADS-D mean score (95% confidence interval)[b]		4.7	4.3	4.4	3.4	3.6	3.4	3.4	2.9
		(4.3-5.2)	(3.9-4.6)	(4.2-4.7)	(3.3-3.4)	(3.0-4.2)	(3.0-3.7)	(3.1-3.8)	(2.8-2.9)
Odds ratio for HADS-D caseness (95% confidence interval)		2.3	1.9	2.0	1.0	2.1	1.4	1.7	1.0
		(1.6-3.3)	(1.4-2.5)	(1.6-2.6)	(reference)	(1.3-3.5)	(0.9-2.2)	(1.2-2.4)	(reference)
Number of paid work hours	< 20	8.3	2.7	4.5	2.1[d]	40.0	18.8	25.5	12.2[d]
per week (%)	>50	40.1	8.3	18.4	4.1[d]	3.3	0.5	1.4	0.6[d]
Often opportunity to use one's abilities at work (%)		75.6	75.1	75.3	79.0	56.4	68.6	64.3	71.9[d]
Heavy manual labour at work (%)		75.3	18.7	40.2	4.9[d]	37.0	1.6	13.3	0.4[d]
Level of education (%)	Less than A-levels/high school	80.9	64.5	70.3	50.4[d]	65.8	58.3	61.0	52.2[d]
	College/university	6.7	27.9	20.4	40.5[d]	15.1	29.8	24.4	37.0[d]
Annual household income,	<200.000	31.3	8.9	16.8	4.7[d]	26.1	18.1	21.2	14.3[d]
NOK[c] (%)	>500.000	4.5	10.0	7.5	29.4[d]	6.3	8.8	7.2	27.0[d]

[a]*Men*: Non-farmers differed significantly (p < 0.05) from all farmers, full-time and part-time farmers, respectively. The differences between full-time and part-time farmers were not significant. *Women*: Non-farmers did not differ significantly from any of the groups all farmers, full-time and non-farmers. Nor were the differences between full-time and part-time farmers significant.

[b]Both genders: As men, footnote[a].

[c]In 1999, NOK 200 000 and 500 000 were equivalent to EUR 24067 and 60168, respectively.

[d]Non-farmers differed significantly from 1) all farmers *and* 2) full-time and/or part-time farmers.

The study showed that male farmers had higher HADS-A levels and farmers of both genders higher HADS-D levels and depression prevalence than non-farmers (Table 11). Among all groups, male animal producers had the highest depression level (5.2, 95% CI: 4.4-6.0) and OR for depressive disorders (3.1, 95% CI: 1.9-5.2). Male farmers reported longer work hours, and farmers of both genders physically heavier work and a lower income and education level, compared to non-farmers. Generally, the differences were largest between full-time farmers and non-farmers. The differences in HADS scores between male *full-time* farmers and non-farmers were explained by the farmers' longer work hours, lower household income and physically heavier work. The corresponding difference in HADS-D score in women was explained by the farmers' shorter work hours and lesser opportunity to use one's abilities at work. However, none of the differences in HADS levels between part-time farmers and non-farmers were explained by factors measured in the study.

8.2.3 Paper III

Table 12. The Swedish Demand-Control-Support Questionnaire: Psychometric properties[a]

	Psychological demands (D)	Decision latitude (DL)	Social support (S)
Factor structure, PCA[b]	1 factor	1 factor	1 factor
Factor loadings, PCA: mean (range)	0.69	0.69	0.74
	(0.53 - 0.77)	(0.61- 0.76)	(0.64- 0.82)
Eigenvalues	2.6	2.6	3.7
Intercorrelation of subscales, explained variance	D/S: 0.06	D/DL: 0.01	DL/S: 0.05
Internal consistency, Cronbach's α	0.73	0.74	0.83

[a]Weighted for different gender representation (N = 5227, 1938 men and 3289 women).

[b]Principal component analysis, oblique rotation. Three separate factors occured both when number of factors were a) limited to three, and b) defined by eigenvalues >= 1.0 (the subscales were examined both simultaneously and separately).

The study encompassed only workers who had answered all the 17 items of DCSQ. This comprised 5227 individuals, constituting 57% of the workers who were given this questionnaire. The analyses were repeated according to gender, skill level (MOGs) and in randomly split halves of the sample. Results are summarised in Table 12. The study gave support to the tri-dimensional factor structure of DCSQ. However, when the sample was divided by MOGs, latitude tended to split into skill discretion and decision authority. The

inter-correlation of the subscales was weak, and both the internal consistency and the specificity of the item loadings was satisfactory (except for item D5's rather weak specificity for demands). The DCSQ showed the same psychometric properties in a sub-sample of depressed individuals as in the main sample.

8.2.4 Paper IV

The study encompassed the 5562 workers with valid DCSQ scores, i.e., 62% of the workers who were given the DCSQ questionnaire. Results of the testing of the JDCS model with HADS-A and HADS-D levels as outcomes are summarised in Table 13 (p. 41). Anxiety and depression levels were positively associated with demands, strain and iso-strain scores and negatively associated with latitude and support scores. The associations were strongest in men, also shown by significant interactions between gender and demands, strain and iso-strain, respectively. Demands, latitude and support were each independently associated with anxiety and depression levels. Support was the index most strongly associated with anxiety and depression in women. High strain and iso-strain as risk factors for anxiety and depression were strongest in men. Repetition of the analyses with anxiety and depression caseness as dependent variables generally gave equivalent results.

9. Discussion

9.1 Materials and methods

9.1.1 Materials

HUSK is a large, population based study with participants living and working in both urban and rural settings, and with representation from a wide spectrum of occupations. The large sample size allows investigation of subgroups. Further, the study includes recognized instruments for assessing anxiety and depression symptom loads and psychosocial work environment, open-ended questions of main occupation and industry which were classified according to internationally standardised classification systems, several other work related factors, and information on demographics, lifestyle and somatic health problems. Thus the HUSK data are well suited to attain the aims of the dissertation.

The most important limitation of HUSK is its *cross-sectional* design, which precludes conclusions about causality. However, the studies of this dissertation served to identify populations at risk, and may thus form the basis for preventative measures. In addition, some

of the findings strengthened old or created new hypotheses on causality, which may be tested in longitudinal studies.

The *restricted age range* may limit the generalisability of the findings. It is largely unknown whether and how possible associations between negative affects and work life are influenced by age. The largest deviations from the HUSK sample would be expected in the extreme ends of the age span, while 40-49 year old workers should be reasonably representative for a major part of working individuals. However, it is known that anxiety and depression levels (119) and PEs (4.2) vary with age, while demands, latitude and support levels hardly do (111, 120). Nevertheless, because of the age homogeneity and the large sample size, a more thorough investigation of subgroups was possible.

Response rates could not be calculated, since the proportion of the source population (34 249 individuals) which was employed is not known. The moderate participation rate represents a possible *response bias.* Higher prevalence than average of mental disorders have been found in non-responders to surveys (10, 121) and in "unskilled" male workers (81). Congruent with the Healthy Worker Effect (122), we found that unemployed had considerably higher anxiety and depression levels than workers. Further, highly "stressed" individuals have increased dropout rates (123), and "uneducated" men are at risk of being lost to follow-up (81). Thus in the present study it is probable that 1) our sample was under-represented by anxious, depressed, highly "stressed" and "unskilled" individuals, suggesting an *underestimation* of the associations between negative affects and skill level (paper I)/the DCSQ indexes (paper IV), and 2) the proportion of working individuals (the target group) was higher among those participating compared to those not. A related problem is the fact that (anxiety and depression prone) subjects may select themselves out of jobs with adverse working conditions such as high strain jobs, which would also cause an *underestimation* of the true risk associated with these adverse conditions (61, 98).

Neither HADS nor DCSQ were included in the first step of HUSK, and DCSQ was included in only two of the five step II questionnaires. This limited the number of valid responses.

Table 13. Testing the Job Demand-Control-Support (JDCS) model[a] with HADS-A and HADS-D levels as outcome variables: Main results

	Men		Women	
	HADS-A	**HADS-D**	**HADS-A**	**HADS-D**
1. Associations DCSQ[a] indexes - HADS levels?	Linear (slightly curvilinear) for all indexes	Linear (slightly curvilinear) for all indexes	Linear (slightly curvilinear) for all indexes	Linear (slightly curvilinear) for all indexes
SRCs (adjusted for other DCSQ subscales)[b]				
-Psychological demands	0.22 (0.22)	0.14 (0.15)	0.14 (0.13)	0.08 (0.07)
-Decision latitude	-0.14 (-0.15)	-0.20 (-0.20)	-0.10 (-0.09)	-0.14 (-0.12)
-Social support	-0.28 (-0.21[e])	<u>-0.30</u> (-0.24[e])	<u>-0.26</u> (-0.22)	<u>-0.26</u> (-0.23)
-Strain[c]	0.26 (0.22[e])	0.24 (0.20[e])	0.16 (0.13)	0.14 (0.11)
-Iso-strain[d]	<u>0.30</u>	0.29	0.22	0.22
2. The strain hypothesis confirmed?	Yes, strongly	Yes, strongly	Yes, moderately	Yes, weakly
3. The iso-strain hypothesis confirmed?	Yes, strongly	Yes, strongly	Yes, strongly	Yes, strongly
4. Interaction psychol. demands - decision latitude?	No	Yes (p = 0.046)	No	No
-Buffering effect of decision latitude?		No (synergistic effect)		
5. Interaction strain - social support?	No	No	No	No
6. Gender: Moderator for the associations in 1?	Gender interacted significantly with demands, strain and iso-strain regarding both HADS-A and HADS-D scores			
7. Confounding of the associations in 1?	No significant confounding			

[a]Instruments for testing the JDCS model: DCSQ (The Swedish Demand-Control-Support Questionnaire) and HADS (Hospital Anxiety and Depression Scale); HADS-A: Anxiety score; HADS-D: Depression score.

[b]SRCs: Standardized regression coefficients. Parentheses: Demands adjusted for latitude and support, latitude for demands and support, support for demands and latitude and strain for support. Underlined SRCs: Highest SRC values for the corresponding HADS scores.

[c]Strain: Demands divided by latitude score.

[d]Iso-strain: Strain divided by support score.

[e]Below 95% confidence interval for crude beta after adjustment.

9.1.2 Methods

Categorical versus dimensional assessment of anxiety and depression

HADS is a dimensional instrument for assessing anxiety and depression, and as such does not provide defined diagnoses of anxiety and depressive disorders. However, the categorical DSM system makes "no assumption that each mental disorder is a discrete entity with sharp boundaries (discontinuity) between it and other mental disorders, or between it and no mental disorder" (124, p. xxii). For example, no natural classes of depression have been demarcated (8). Thus, it may be asserted that anxiety and depression exist on a continuum, being measurable by dimensional scaling (8).

The continuing controversies regarding the relative merits of dimensional versus diagnostic measurement may be based on a false dichotomy (125). Dimensional instruments are routinely converted to categorical statements by the application of cut-off levels. Also categorical measurements, insofar as they include algorithmic steps, almost always involve some dimensional assessments. Because both approaches have their pros and cons, the choice of instrument should be determined by study aims and available resources (finances, labour etc). For a large epidemiological study like HUSK, where assessment of negative affects constitutes a minor part as regards allocated resources, the choice of a self-report dimensional instrument is natural.

A specific argument for using a dimensional approach when studying workers, is the Healthy Worker Effect (122). It is a constant finding that the working population has less somatic and mental health problems compared to non-working individuals. Thus it is to be expected that the main part of the variation in anxiety and depressive symptomatology in worker samples is found in the sub-clinical area. Therefore, continuous measures should be more apt to pick up subtle differences between working groups. Our results confirmed this hypothesis. Although levels and caseness of negative affects consistently showed the same patterns in their associations with work related factors, mean HADS scores were more suited than HADS caseness to identify differences between worker groups.

HADS as an assessment instrument for anxiety and depression

The use of identical instruments in different studies facilitates comparisons between studies. Thus the inclusion of HADS in The Nord-Trøndelag Health Study 1995-97 (HUNT) was decisive for the choice of the same instrument in HUSK. This questionnaire covers both anxiety and depression. Both anxiety and depressive disorders are frequent, and they are often co-morbid (126). There is also a high correlation between anxiety and depressive symptoms

(107). The finding of differences between anxiety and depression in their associations with occupational grouping (paper I) supports the assessment of both conditions.

Another argument for choosing HADS is its lack of items on severe psychopathology, making HADS more sensitive to milder psychopathology, thus "avoiding the 'floor effect' that is frequently observed when psychiatric rating scales are used in non-psychiatric samples" (119). Due to the Healthy Worker Effect this may be particularly important when examining workers (122). Results from HUNT and other studies have shown that the psychometric properties of HADS are good (107, 127). When compared to other questionnaires for anxiety and depression in common use (e.g., the 28 item version of the General Health Questionnaire, Beck's Depression Inventory, the Clinical Anxiety Scale and the anxiety and depression subscales of the Symptom Checklist 90 Scale), it is brief, and the concurrent validity has been found to be "good to very good" (107). HADS also allows for the examination of prevalence, by applying a cut-off level of eight or above on HADS-A and/or HADS-D (7.2).

The rather narrow concepts of anxiety and depression in HADS (7.2) represent a limitation. As regards anxiety disorders, items on agoraphobia, specific and social phobia, obsessive-compulsive disorder and post-traumatic stress disorder are not included.

In HUNT, the OR for depression caseness (HADS-D score >= 8) was significantly higher in men than in women (119). For the particular age group 40-49 years, OR for women versus men was 0.88 (95% CI: 0.78-0.98). The corresponding OR in HUSK was similar, i.e., 0.79 (95% CI: 0.71-0.86). Studies from other countries have shown minimal if any differences in HADS-D scores between the genders (119) or significantly higher scores in women (128). Gender differences in HADS-D scores/HADS depression caseness between studies performed in different countries may be due to subtle discrepancies in meaning between the translations, or represent real differences.

Most prevalence studies using other assessment instruments than HADS show higher depression rates in women (4.2.3). Three main explanations for the discrepant findings between most studies using HADS and studies using other instruments could be: different concepts of depression, different data collection procedures and the difference between population (census) studies and studies based on sampling (119). Concerning the first explanation, HADS is made for the assessment of anxiety and depression in patients in somatic hospitals, and, therefore, does not include items on somatic symptoms (129). Silverstein (26) showed that women in NCS exhibited a higher prevalence of "somatic" depression than men, but not a higher prevalence of "pure" depression.

Assessment of psychosocial work environment. DCSQ

One of the most controversial issues in occupational stress research concerns how to assess psychosocial work environment, whether by questionnaires, imputation of job characteristics scores, or by external assessment (69). In spite of inherent weaknesses such as self-report bias (see also below) (67, 130), SAQs have been extensively used, and constitute an important part of a multi-method approach, which is the preferable research strategy (66, 67, 69, 110). In fact, studies not using self-report are generally non-supportive of the JDCS model, suggesting that the way in which the individual experiences his/her job environment is crucial to its effects (66). Research on general social support (i.e., both in and outside of the work place) has shown that perceived and "actually received" support may differ considerably (28, pp. 394-395). Thus it may be argued whether the main active component is social or intra-psychic (28, 68, 123). It is noteworthy that associations between psychosocial work environment and depressive symptoms in the large longitudinal GAZEL study could not be explained by differences in personality traits (94). Nevertheless, the lack of a more "objective" method for assessing psychosocial work environment in HUSK, such as external assessment, as well as the absence of instruments for assessing personality traits, represent limitations.

The most widely used questionnaire is the Job Content Questionnaire (JCQ), which has been validated in several languages (98, 123). DCSQ is also widely used (98), and is an alternative to the more extensive JCQ. However, the psychometric properties of DCSQ had not been examined in a large sample before they were examined in HUSK, where they were found to be satisfactory (paper III).

The DCSQ subscales were not included when possible confounders were adjusted for in papers I and II, because of the relatively low number of valid responses. Paper IV showed strong associations between these subscales and negative affects. Another limitation related to the use of DCSQ in HUSK concerns the observation that the DCSQ support items were unfit for assessing (lack of) social support in farmers, since they mostly spend their work days alone. Social isolation is a known stress factor in farming (131).

Self-report bias

A certain *self-report bias* is possible: Self-reports on demands, latitude, support and other subjective responses may be biased towards the negative in individuals with poor psychological well-being, particularly those who are depressed (67, 130). On the other hand, workers with good mental health may under-report job stressors. Thus, associations between the DCSQ indexes and negative affects may be *overestimated*, particularly as regards

depression. Support is probably the DCSQ index that is most liable to be biased in this way, since the support items are oriented towards how the worker perceives the atmosphere at the work-place. This may be different for the JCQ support subscales, since they are more objective and instrumental in nature (69).The problem is also potentially significant for the demands subscale, but is probably not important for latitude, because of the high self-report - observer inter-reliability for this index (123). The possible self-report bias was also the reason why the variables 'perception of having enough good friends' and 'opportunity to use one's abilities at work' were not included in study IV. The questions had not been validated, and could easily represent another measure of negative affects.

Statistical procedures

Examination of possible differences in HADS levels between groups in studies I and II were primarily examined by ANOVA. When heteroscedasticity occurred, the analyses were repeated using the non-parametric Kruskal-Wallis test. Although both tests assume homoscedasticity (132), the strong and equivalent significance levels obtained by two different approaches support the results.

9.1.3 Conclusion

Although having some limitations, HADS, DCSQ and ISCO-88 are well suited for studying the associations between negative affects and occupational grouping/adverse psychosocial work environment in HUSK. A response bias, if present, will probably cause an underestimation of these associations, as will a self-selection of workers out of high strain jobs. On the other hand, a possible self-report bias will tend to overestimate the associations. The relative importance of these mechanisms in the current studies is unknown. However, it is reasonable to conclude that the associations which were found, generally do exist, while the exact strengths of the associations are not identified. The restricted age range reduces the generalisability of the findings to some extent. Conclusions on the causality of the associations are precluded by the cross-sectional design of HUSK.

9.2 Results in view of earlier findings

9.2.1 General findings

Significant associations between negative affects and occupational grouping/adverse psychosocial work environment were found. Generally, there is considerable evidence for stress as an etiological factor of anxiety and depressive disorders (6, 104). Specifically,

occupational stress ('wear and tear') may lead to the development of negative affects (61, 74, 103). However, the associations found could also be due to selection (papers I and II: personal characteristics may explain both occupational choice and levels of anxiety/ depression) or intra-psychic factors (paper IV: personal characteristics may explain both self-rated levels of adverse psychosocial work environment and negative affects). Paper II indicates a 'wear and tear' dominated explanation regarding the association between farming and negative affects (particularly the finding that the considerably higher depression level in male full-time farmers compared to non-farmers could be explained by work related factors, 9.2.2), suggesting that at least in some groups, adverse working conditions may contribute considerably to the development of anxiety and depression. A 'wear and tear' explanation is also supported by results from a quasi experimental study, which suggested that social causation (adversity and stress) is more important than social selection (downward mobility of genetically disposed) in explaining the inverse relationship between major depression and SES (133). In addition, Link et al. (28, pp. 398-408) examined one of the mechanisms through which this may occur, namely occupational control. The results were consistent with a social causation model: High SES led to occupations that allowed direction, control, and planning of one's own activities. These work characteristics, in turn, were protective with respect to depression.

In general, the associations between negative affects and work related factors were stronger in men. The findings are congruent with studies of psychosocial work environment, which generally show considerably less support for the negative impact of high strain in female employees (66, 98), indicating that males are more negatively affected by adverse psychosocial working conditions than females. One possible explanation is that the psychological load in the home situation compared to at work is relatively more influential in women (98).

The higher levels and PEs of anxiety in women than in men are congruent with findings from most epidemiological studies (4.2.2). For discussion of the higher HADS depression caseness in men, see 9.1.2.

9.2.2 Papers I-IV

Paper I

This is the first European study that examines the occupational distribution of anxiety and depression in a large population, and the first study to use the ISCO-88 classification. ECA showed that the lifetime prevalence of any mental disorder in men was higher among

"unskilled" than among those "skilled" or with "higher occupational status" (81). However, the North American studies that examined the occupational distribution of anxiety and depression, did not show as strong an association between negative affects and skill level as in the present study (5, 76-78, 82). This may be due to the use of other classification systems than ISCO-88, whose structure is based on differences in skill level. Kessler & Frank (5) were required to carry out the analyses within broad occupational clusters because of the relatively small sample size. They also used a categorical instrument for assessing anxiety and depression, which may be less suited than a dimensional one, such as HADS, for showing more subtle differences between groups (9.1.2).

Paper II

To our knowledge, this is the largest published study so far that examined anxiety and depression levels in farmers, and one of the few that have examined anxiety in this occupation. Hitherto the knowledge on negative affects in female farmers has been minimal, as the few studies that have involved female farmers only included a low number. Further, the comparison between full- and part-time farmers has not been addressed previously.

Farmers in HUSK were found to score "strikingly" low on mental health-related quality of life (134), thus strengthening our results. Roberts & Lee (78) found an increased prevalence of depression in farmers in ECA. However, ours is the first large study to show increased anxiety levels in male farmers. Other novel findings were the equally high anxiety and depression levels in full- and part-time farmers, and differences in the two groups regarding explanatory factors.

Roberts & Lee (78) did not offer any explanations as to why farmers had a high depression prevalence in ECA. However, the finding could not be explained by age, gender or education. The increased levels of anxiety and depression in farmers shown in paper II could be due to an increased *selection into* farming of individuals prone to negative affects (lower level of education, more unmarried men, 4.2), or a decreased *selection out of* farming of such individuals. However, it is equally probable that difficulties related to agricultural work have caused *exclusion* of anxiety/depression prone persons (90). Probably the findings are mainly consequences of *'wear and tear'*: The considerable difference in depression level between male full-time farmers and non-farmers could be explained by the full-time farmers' longer work hours, physically harder work and lower income. The farmers' long work hours (89) may, as a single factor, have negative health effects (87). However, a low and declining income probably represents the most important stressor (89). Economic stress is known to be

one of the major predictors of psychiatric morbidity and suicide (89, 90). According to the Effort-Reward Imbalance Model, the combination of a heavy work load and low reward (financially, job insecurity etc) is particularly stressful (74).

High levels of negative affects in spite of a more conservative and 'healthy' lifestyle among farmers (less divorce, more children, fewer smokers, less alcohol consumption and among men, more physical activity in leisure time) may also point in the direction of the 'wear and tear' hypothesis. The 'existential crisis' currently among farmers probably also represents a considerable strain, namely the prospect of having to give up their way of life and the land itself, handed down for generations (135). This means that many farmers face much more than a threat of job loss, which in itself is a considerable stress factor (61).

A limitation of our study is the lack of data on farm size. According to the Norwegian Farmers' Union, farms in Hordaland are relatively small compared to farms in other counties. Compared to farmers on large farms, those on small farms probably have lower income and higher levels of economic stress, and possibly less social support (89).

Paper III

This is the first study to examine the psychometric properties of the widely used DCSQ in a large population, and we found these properties to be satisfactory. This also applies to the internal consistency of the DCSQ subscales, which was satisfactory even in the depressed and those with low education, two groups for whom reliability tends to be poorer compared to the general population (114). The exclusion of the latitude item 'Does your work require skills?' represents a limitation of the study. However, the corresponding item has not shown low loadings on the JCQ decision latitude factor (111, 120, 136). It is, therefore, probable that the inclusion of a correct translation of the item would increase Cronbach's α for the latitude subscale.

Decision latitude consists of the two distinct constructs skill discretion and decision authority. In accordance with Pelfrene et al. (111), we suggest that skill discretion and decision authority are preferred when latitude naturally splits into these two subscales, which tends to happen in latitude homogeneous samples, particularly when specific occupational groups are examined. However, it seems reasonable to use latitude when studying occupationally heterogeneous samples, such as HUSK.

Paper IV

Most of our results find support in other studies (4.4.3): Levels/caseness of anxiety and depression increased with increasing demands and decreasing latitude and support scores (71, 91-94). Social support was the subscale most strongly associated with anxiety and depression (71, 73). The strain (66, 71, 96, 97) and iso-strain (66, 71) hypotheses were confirmed. The finding of a significant interaction between demands and latitude regarding HADS-D score in men, finds some support (66). Congruent to other studies, we found a lower latitude score and a higher proportion of 'high strain' jobs in women compared to men (111, 123). That the associations between negative affects and psychosocial work environment could not be explained by differences in SES (income, level of education and occupational grouping), has also been shown in other studies (61, p. 42; 95).

The depression scale used in the large cross-sectional BELSTRESS study consisted of a combination of depression, anxiety and hostility items (71). Contrary to what was done in the longitudinal Whitehall II and GAZEL studies (91-94), Pelfrene et al. (71) tested both the strain, iso-strain and buffer hypotheses. Compared to BELSTRESS, a more comprehensive examination of possible interactions was done in our study, demonstrating the advantages and limitations of the different operationalisations (69).

We found only one of the (multiplicative) interactions to be statistically significant (a synergistic effect). The few results showing significant interactions, representing buffer or synergistic effects, could be due to the frequent use of self-report measures, which tend to overestimate the strengths of the associations between adverse psychosocial work environment and psychological distress at the cost of underestimating interaction effects (137). The other operationalisations of the interaction hypotheses studied in paper IV demonstrated a considerable strengthening of the associations with anxiety and depression when demands, latitude and support were combined. Thus, whether the significance levels of the interaction terms were slightly above or below 0.05 may be more of academic interest.

The finding of no buffer effects of latitude and support, in HUSK as well as in BELSTRESS (71), is in accord with most of the literature (66). If such effects had been confirmed, job-(re)designers could focus on the moderating effects of latitude (to reduce strain) and support (to reduce iso-strain), while the reduction of demands would be less important.

10. Conclusion and implications

The contribution of the dissertation papers may be summarised as follows: Negative affects, particularly depression in men, show a distinct and inverse association with skill level. Workers in elementary occupations and farming are at risk for anxiety and depression. Male farmers were found to have the highest depression level of all occupational groups. The high depression level in male full-time farmers could be explained by long work hours, low income and physically hard work. The psychometric properties of DCSQ were found to be satisfactory. Perceived high demands, low latitude and low support, separately and particularly combined, are substantial risk factors for anxiety and depression. When studying the interplay between demands, latitude and support, the use of different operationalisations may give complementary information.

Programs for early detection and treatment of depressive disorders in low-skill occupations should be considered. The high levels and caseness of depression in male farmers are concerning. Preventative measures, such as mental health education programs, teaching of coping strategies, self-help groups and specific practical support (with financial problems, retraining for those who wish to leave farming etc.), as well as screening for cases in need of treatment should be strongly considered. DCSQ, being shorter and easier to use, is an important alternative to the Job Content Questionnaire, particularly when respondent burden and data-collection costs need to be minimised, such as in large epidemiological studies. Assessment of psychological work environment may serve to identify workers at risk for anxiety and depression, as well as basis for job-redesigning. The latter may prevent new cases, and make it easier for anxious and depressed workers to stay at or return to work. Because of no buffering effects of latitude (on demands) and support (on strain), it is important both to reduce demands and to increase latitude and support when called for. Nevertheless, the most important intervention in women is probably to increase social support.

Finally, primary and occupational health care workers, particularly physicians, should be made aware of the increased risk of anxiety and depression in low-skill occupations, farming, and for those experiencing adverse psychosocial work environment.

11. Recommendations for future studies

Generally, the literature on the interplay between work life and anxiety and depression is scarce. Thus the need for well-designed studies, particularly longitudinal, is obvious. The Norwegian health surveys represent a unique possibility in this context. By including identical measures and (a sample of the original) probands in subsequent screenings, a prospective approach is obtained, thus making it possible to draw conclusions about causality. Further, by including identical instruments in the health screenings of several counties, generalisability of the results and, if different data sets are combined, precision of the measurements can be improved.

The number of farms in Norway was halved between 1970 and 2000, and is predicted to be halved once more between 2000 and 2015. Thus farmers are going through major transitions. A longitudinal study of farmers' mental health may give important information on causal factors.

The demands and latitude subscales of DCSQ and the Job Content Questionnaire appear to be very similar, while the social support subscales differ considerably. A comparative study of the two questionnaires would be helpful in order to obtain information on corresponding strengths and weaknesses.

Mental and physical disorders are positively associated, and are risk factors for each other (6). According to the JDCS model, high strain is a risk factor for both somatic and mental health problems. HUSK data make it possible to test the JDCS model with cardiovascular risk factors and disease as outcomes. If the strain and iso-strain hypotheses are confirmed, it may be investigated 1) to what extent exposure to high strain is associated with negative affects and somatic problems in the same individuals, and 2) whether high strain groups that are positively associated with negative affects, cardiovascular risk/disease and both, respectively, differ as regards work related factors, demographics, lifestyle and somatic health.

12. Errata

Paper I

-Page 630, Table 1, post hoc test, HADS-A, men: "Scheffé's test" should be replaced with "Tamhane's T2 test".

-Page 631, *Demographics, Individual Lifestyle, and Somatic Health Problems* (4. line): "parity" should be replaced with "child(-ren) (yes/no)"

-Page 631, *Statistics*, 1. paragraph, 16. line: "Tables 2 and 5, but unless it is otherwise is stated " should be replaced with "Table 2, but unless otherwise is stated".

-Page 635, *Submajor Occupational Groups*, 2. paragraph, 6. line: "significantly 'higher' than..." should be replaced with "close to being significantly higher than".

-Page 637, *Reference number 23*: "Allugander" should be replaced with "Allgulander".

The following quotation marks were changed by the journal after the authors' final proof reading:

-Page 631, *Statistics*, 2. paragraph, 12. line: " 'higher' " should be replaced with "higher".

-Page 632, Table 2, 5. footnote: "Lower" should be replaced with " 'lower' ".

-Page 632, Table 2, 6. footnote: "Higher" should be replaced with " 'higher' ".

-Page 633, Table 3, 2. footnote: "higher and lower" should be replaced with " 'higher' and 'lower' ".

-Page 633, Table 3, 3. footnote, 2. line: "lower and higher" should be replaced with " 'lower' and 'higher' ".

-Page 635, *Submajor Occupational Groups*, 2. paragraph, 16. line: " 'higher' " should be replaced with "higher".

-Page 635, *Industrial Sections and Divisions*, 6. line: " 'higher' " should be replaced with "higher".

Paper II

Page 94, *Demographics, individual lifestyle and somatic health problems* (3. line): "parity" should be replaced with "child(-ren) (yes/no)".

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14. Appendix: HUSK questionnaires

-Step I questionnaire

-Example of step II questionnaire (includes all relevant variables)

HELSEUNDERSØKELSEN
I HORDALAND 1997-99

Adresse endring

HUSK

Personlig innbydelse

SP02B

Hvor ofte i løpet av de siste 4 ukene har du hatt mye overskudd? Sett bare ett kryss.

	JA
Hele tiden	☐ 1
Nesten hele tiden	☐ 2
Mye av tiden	☐ 3
En del av tiden..	☐ 4
Litt av tiden	☐ 5
Ikke i det hele tatt	☐ 6

Hvor ofte i løpet av de siste 4 ukene har du følt deg nedfor og trist? Sett bare ett kryss.

	JA
Hele tiden	☐ 1
Nesten hele tiden	☐ 2
Mye av tiden	☐ 3
En del av tiden..	☐ 4
Litt av tiden	☐ 5
Ikke i det hele tatt	☐ 6

I løpet av de siste 4 ukene, hvor mye av tiden har din fysiske helse eller følelsesmessige problemer påvirket din sosiale omgang(som det å besøke venner, slekt)? Sett bare ett kryss.

	JA
Hele tiden	☐ 1
Nesten hele tiden	☐ 2
Mye av tiden	☐ 3
En del av tiden..	☐ 4
Litt av tiden	☐ 5
Ikke i det hele tatt	☐ 6

Stort sett, vil du si at din helse er:

Utmerket	Meget god	God	Nokså god	Dårlig
☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

11. BRUK AV MEDISINER

Med medisiner mener vi her alle slags medisiner, både:
- *med og uten resept, naturmedisin, vitaminer og mineraler*
- *medisin som svelges, inhaleres eller injiseres, stikkpiller, salver, kremer eller dråper.*

	JA	NEI
Tok du noen slags medisiner I GÅR?...............................	☐	☐

Hvis NEI, kan du gå til avsnitt 12.

Hvis JA, besvar følgende:

Hvilke medisiner tok du I GÅR, og hva var grunnen til at du tok medisinen (diagnose, sykdom, symtom, helseeffekt)?
Sett svarene inn i skjemaet nedenfor, en linje for hver medisin. Kryss av for ja om du bruker medisinen daglig eller nesten daglig.

Navn på medisinen *(ett navn pr. linje):*	Grunn til bruk av medisinen I GÅR var:	Daglig JA	NEI

Dersom det ikke er nok plass her, kan du fortsette på eget ark som legges ved.

12. ARBEID

Besvares av dem som har hatt inntektsgivende arbeid i minst 100 timer det siste året:
Beskriv virksomheten på det arbeidsstedet der du utførte inntektsgivende arbeid i lengst tid de siste 12 mnd. *(Skriv f.eks. jordbruk, barneavd. på sykehus, snekkeravd. på skipsverft e.l.).*

Virksomhet:

☐

Hvilket yrke/tittel har eller hadde du på dette arbeidsstedet?
(Skriv f.eks. kornbonde, anestesisykepleier, snekker e.l.)

Yrke:

☐

Hvor lenge har du praktisert i dette yrket i ditt liv? .... | Antall år i yrket ☐☐

Har du noen av de følgende yrker (*heltid eller deltid*)?
Sett kryss for hvert spørsmål.

	JA	NEI
Sjåfør	☐	☐
Bonde/gårdbruker...	☐	☐
Fisker..	☐	☐

Har du tidligere i ditt liv (*ikke i dag*) hatt inntektsgivende arbeid som:

	JA	NEI
Bilmekaniker/biloppretter	☐	☐
Frisør	☐	☐

13. SAMLIV

Oppgi antall egne barn (eventuelt 0) av hvert kjønn:

Antall gutter ☐☐   *Antall jenter* ☐☐

	JA	NEI
Har du noen gang hatt regelmessig samliv uten prevensjon i ett år eller mer uten at det har ført til graviditet?...	☐	☐

Med prevensjon menes også mer usikre metoder som avbrutt samleie, «sikre perioder» etc.

De følgende spørsmål besvares bare av kvinner

Har du noen gang spontanabortert (ufrivillig mistet fosteret) etter at graviditet var sikkert påvist?

NEI	USIKKER	JA	Hvis JA:
☐	☐	☐	Antall ganger ☐☐

Følgende spørsmål besvares bare hvis du har vært gravid:
Oppgi antall måneder det tok med regelmessig samliv uten prevensjon (eller evt. amming), til du ble gravid:

Siste svangerskap .... ☐☐ *mnd. uten prevensjon*

Nest siste svangerskap............. ☐☐ *mnd. uten prevensjon*

Tredje siste svangerskap .... ☐☐ *mnd. uten prevensjon*

14. ETTERUNDERSØKELSE

Hvis denne helseundersøkelsen viser at du bør undersøkes nærmere, hvilken allmennpraktiserende lege/kommunelege ønsker

☐

Ikke skriv i disse rutene ☐☐☐☐   ☐☐☐☐

Takk for utfyllingen!

Nok en gang: **Velkommen til undersøkelsen**

Spørreskjemaet er en viktig del av helseundersøkelsen. Vennligst fyll ut skjemaet på forhånd og ta det med til helseundersøkelsen. Dersom enkelte spørsmål er uklare, lar du dem stå ubesvart til du møter fram, og drøfter dem med personalet som gjennomfører undersøkelsen.
   Alle svar vil bli behandlet strengt fortrolig.

Det utfylte skjemaet vil bli lest av en maskin. Bruk blå eller sort farge ved utfylling. Det er viktig at du går fram slik:
- i de små boksene setter du kryss for det svaret som passer best for deg
- i de store boksene skriver du tall eller blokkbokstaver – NB! innenfor rammen for boksen.

Eksempler:
Avkryssing: [X]   Tall: [1][2][3][4][5][6][7][8][9][0]   Bokstaver: [A][B][C]

Med vennlig hilsen
Statens helseundersøkelser ♥ Kommunehelsetjenesten ♥ Helseundersøkelsen i Hordaland

1. EGEN HELSE

Hvordan er helsen din nå? *(Sett bare ett kryss)*

Dårlig	Ikke helt god	God	Svært god
[ ] 1	[ ] 2	[ ] 3	[ ] 4

Har du, eller har du hatt: JA   NEI   Alder første gang

	JA	NEI	
Hjerteinfarkt	[ ]	[ ]	[ ] år
Angina pectoris (hjertekrampe)	[ ]	[ ]	[ ] år
Hjerneslag/hjerneblødning	[ ]	[ ]	[ ] år
Astma	[ ]	[ ]	[ ] år
Diabetes (sukkersyke)	[ ]	[ ]	[ ] år
Multippel sklerose	[ ]	[ ]	[ ] år

Bruker du medisin mot høyt blodtrykk?

Nå	Før, men ikke nå	Aldri brukt
[ ] 1	[ ] 2	[ ] 3

Har du noen gang det siste året hatt eksem (rød, kløende, sår og sprukken hud):

	JA	NEI
På hendene?	[ ]	[ ]
I ansiktet?	[ ]	[ ]
Andre steder på kroppen?	[ ]	[ ]

Med «hvite fingre» mener vi plager i form av at en eller flere fingre blir hvite og at man samtidig mister følelsen i dem når det er kaldt. Har du slike plager? ....   JA [ ]   NEI [ ]

2. HVORDAN FØLER DU DEG?

Har du de siste to ukene følt deg:

	Nei	Litt	En god del	Svært mye
Nervøs og urolig?	[ ]	[ ]	[ ]	[ ]
Plaget av angst?..............	[ ]	[ ]	[ ]	[ ]
Trygg og rolig?.................	[ ]	[ ]	[ ]	[ ]
Irritabel?	[ ]	[ ]	[ ]	[ ]
Glad og optimistisk?........	[ ]	[ ]	[ ]	[ ]
Nedfor/deprimert?	[ ]	[ ]	[ ]	[ ]
Ensom?	[ ]	[ ]	[ ]	[ ]
	1	2	3	4

3. SYKDOM I FAMILIEN

	JA	NEI	VET IKKE
Har en eller flere av foreldre eller søsken hatt hjerteinfarkt (sår på hjertet) eller angina pectoris (hjertekrampe)?	[ ]	[ ]	[ ]

Har en eller flere foreldre/søsken hatt:

	JA	NEI	VET IKKE
Hjerteinfarkt *før* de fylte 60 år?.................................	[ ]	[ ]	[ ]
Hjerneslag/hjerneblødning *før* de fylte 70 år?	[ ]	[ ]	[ ]

4. MUSKEL- OG SKJELETTPLAGER

	JA	NEI
Har du i løpet av det siste året vært plaget med smerter og/eller stivhet i muskler og ledd som har vart i minst 3 måneder sammenhengende?..............	[ ]	[ ]

Hvis NEI, gå til avsnitt 5.
Hvis JA, svar på følgende:

Hvor har du hatt disse plagene?

	JA	NEI
Nakke	[ ]	[ ]
Skuldre (aksler)	[ ]	[ ]
Albuer	[ ]	[ ]
Håndledd/hender	[ ]	[ ]
Bryst, mage	[ ]	[ ]
Øvre del av ryggen	[ ]	[ ]
Korsryggen	[ ]	[ ]
Hofter..	[ ]	[ ]
Knær..	[ ]	[ ]
Ankler, føtter	[ ]	[ ]

Hvor lenge har plagene vart sammenhengende?
Svar for det området hvor plagene har vart lengst.

Hvis under 1 år, oppgi antall måneder............*Antall mnd.* [ ]

Hvis 1 år eller mer, oppgi antall år ....*Antall år* [ ]

Har plagene redusert din arbeidsevne det siste året?
Gjelder også hjemmearbeidende. Sett bare ett kryss.

Nei/ubetydelig	I noen grad	I betydelig grad	Vet ikke
[ ] 1	[ ] 2	[ ] 3	[ ] 4

	JA	NEI	Ikke i arbeid
Har du vært sykmeldt p.g.a. disse plagene det siste året?	[ ]	[ ]	[ ]

	JA	NEI
Har plagene ført til redusert aktivitet i fritiden?	[ ]	[ ]

5. MOSJON

Hvordan har din fysiske aktivitet i fritiden vært det siste året?
Tenk deg et ukentlig gjennomsnitt for året.
Arbeidsvei regnes som fritid. Besvar begge spørsmålene.

	Timer pr. uke			
	Ingen	Under 1	1-2	3 og mer
Lett aktivitet *(ikke svett/andpusten)*	[ ]	[ ]	[ ]	[ ]
Hard fysisk aktivitet *(svett/andpusten)*	[ ]	[ ]	[ ]	[ ]
	1	2	3	4

6. KAFFE / TE / ALKOHOL

Hvor mange kopper kaffe/te drikker du daglig?
Sett 0 hvis du ikke drikker kaffe/te daglig.

Antall kopper daglig

Kokekaffe	**Annen kaffe**	**Te**	T
☐☐	☐☐	☐☐	

	JA	NEI
Er du total avholdsmann/-kvinne?.................................	☐	☐

Hvor mange ganger i måneden drikker du vanligvis alkohol? *Regn ikke med lettøl.*
Sett 0 hvis mindre enn 1 gang i mnd.............*Antall ganger* ☐☐

Hvor mange glass øl, vin eller brennevin drikker du VANLIGVIS i løpet av to uker?
Regn ikke med lettøl. Sett 0 hvis du ikke drikker alkohol.

Glass øl	**Glass vin**	**Glass brennevin**
☐☐	☐☐	☐☐

7. RØYKING

Hvor lenge er du vanligvis daglig tilstede i røykfylt rom?............................*Antall hele timer* ☐☐
Sett 0 hvis du ikke oppholder deg i røykfylt rom.

Røyker du selv:	JA	NEI
Sigaretter daglig?	☐	☐
Sigarer/sigarillos daglig?	☐	☐
Pipe daglig?..	☐	☐
Aldri røykt daglig .... (Sett kryss) ☐		

Hvis du har røykt daglig tidligere, hvor lenge er det siden du sluttet?..............................*Antall år* ☐☐

Hvis du røyker daglig nå eller har røykt tidligere:

Hvor mange sigaretter røyker eller røykte du vanligvis daglig? ....*Antall sigaretter* ☐☐

Hvor gammel var du da du begynte å røyke daglig? ....*Alder i år* ☐☐

Hvor mange år til sammen har du røykt daglig? ....*Antall år* ☐☐

8. ENDRING AV HELSEVANER

Dette gjelder din interesse for å endre helsevaner. Røykespørsmålet besvares bare av dem som røyker.	**Spise sunnere**		**Trimme mer**		**Slutte å røyke**	
	JA	NEI	JA	NEI	JA	NEI
Har du de siste 12 mnd. forsøkt å:	☐	☐	☐	☐	☐	☐

	JA	NEI	JA	NEI	JA	NEI
Om 5 år, tror du at du har endret vaner på noen av disse områdene?............................	☐	☐	☐	☐	☐	☐

	Høyeste vekt	**Laveste vekt**
Anslå din høyeste og laveste vekt i løpet av de siste 5 år. *(Hele kg)* *(Se bort fra vekt under svangerskap)*	☐☐☐	☐☐☐

9. UTDANNING

Hvilken utdanning er den høyeste du har fullført?
Sett bare ett kryss.

Mindre enn 7 år grunnskole.................................	☐ 0
Grunnskole 7-10 år, framhaldsskole, folkehøgskole...	☐ 1
Realskole, middelskole, yrkesskole, 1-2 årig videregående skole	☐ 2
Artium, øk.gymnas, allmennfaglig retning i videregående skole	☐ 3
Høgskole/universitet, mindre enn 4 år	☐ 4
Høgskole/universitet, 4 år eller mer	☐ 5

10. HELSE OG TRIVSEL

De neste spørsmålene handler om hvordan du ser på din egen helse. Hvis du er usikker på hva du skal svare, vennligst svar så godt du kan.

Er din helse slik at den begrenser deg i utførelsen av disse aktivitetene NÅ?

Moderate aktiviteter som å flytte bord, støvsuge, gå en tur eller drive med hagearbeid:

Ja, begrenser meg mye	Ja, begrenser meg litt	Nei, begrenser meg ikke i det hele tatt
☐	☐	☐

Gå opp trappen flere etasjer:

Ja, begrenser meg mye	Ja, begrenser meg litt	Nei, begrenser meg ikke i det hele tatt
☐	☐	☐

I løpet av de siste 4 ukene, har du hatt noen av de følgende problemer i ditt arbeid eller i andre av dine daglige gjøremål på grunn av din fysiske helse?

	JA	NEI
Du har utrettet mindre enn du hadde ønsket....................	☐	☐
Du har vært hindret i å utføre visse typer arbeid eller gjøremål...	☐	☐

I løpet av de siste 4 ukene, har du hatt noen av de følgende problemer i ditt arbeid eller i andre av dine daglige gjøremål p.g.a. følelsesmessige problemer?
(Som f.eks. å være deprimert eller engstelig)

	JA	NEI
Du har utrettet mindre enn du hadde ønsket....................	☐	☐
Du har utført arbeidet eller andre gjøremål mindre grundig enn vanlig	☐	☐

T

I løpet av de siste 4 ukene, hvor mye har smerter påvirket ditt vanlige arbeid?
(Gjelder både i og utenfor hjemmet) Sett bare ett kryss.

	JA
Ikke i det hele tatt	☐ 1
Litt..	☐ 2
En del	☐ 3
Mye...	☐ 4
Svært mye	☐ 5

Hvor ofte i løpet av de siste 4 ukene har du følt deg rolig og harmonisk? Sett bare ett kryss.

	JA
Hele tiden	☐ 1
Nesten hele tiden	☐ 2
Mye av tiden	☐ 3
En del av tiden...	☐ 4
Litt av tiden	☐ 5
Ikke i det hele tatt	☐ 6

HELSEUNDERSØKELSEN I HORDALAND 1997-99

Kvinner 2

T

DAG	MÅNED	ÅR

Dato for utfylling av skjema

HUSK

Takk for at du har tatt deg tid til å komme til helseundersøkelsen! Denne undersøkelsen omfatter flere delprosjekt, og vi ber deg derfor om at du også fyller ut dette spørreskjemaet. Resultatene vil bli brukt i forskning om forebyggende helsearbeid. Noen av spørsmålene ligner på de du har svart på tidligere. Der er likevel viktig at du svarer på alle spørsmålene også i dette skjemaet. Du kan enten fylle ut skjemaet og levere konvolutten til sykepleierne når du går, eller du kan ta det med hjem og returnere skjemaet per post. Porto er betalt.

Alle svar vil bli behandlet strengt fortrolig.

Det utfylte skjemaet vil bli lest av en maskin. Bruk blå eller sort farge ved utfylling.
Det er viktig at du går frem slik:
• i de små boksene setter du kryss for det svaret som passer best for deg.
• i de store boksene skriver du tall eller blokkbokstaver –
  NB! innenfor rammen for boksene.

Eksempler:
Avkryssing: ☒   Tall: 1 2 3 4 5 6 7 8 9 0   Bokstaver: A B C

Vennlig hilsen
Helseundersøkelsen i Hordaland 1997 – 99. Statens helseundersøkelser – Universitetet i Bergen – Kommunehelsetjenesten   T

BOFORHOLD

I hvilken kommune bodde du da du fylte 1 år?
Hvis du ikke bodde i Norge, oppgi land i stedet for kommune.

Ikke skriv i disse rutene ➢

Hvilken type bolig bor du i? *Sett bare ett kryss*

Enebolig/villa .... ☐

Gårdsbruk... ☐

Blokk/terrasseleilighet.. ☐

Rekkehus/2-4 mannsbolig .... ☐

Annen bolig... ☐

Hvor stor er din boenhet? .... *m²*

	JA	NEI
Er det heldekkende tepper i stua?.......................	☐	☐
Er det katt i boligen?	☐	☐
Er det hund i boligen?	☐	☐

Hvem bor du sammen med?
Sett ett kryss for hvert spørsmål og angi antall.

	JA	NEI	ANTALL
Ektefelle/samboer	☐	☐	
Andre personer over 18 år	☐	☐	
Personer under 18 år	☐	☐	

Hvor mange av barna har plass i barnehage? ....

T

HELSE

Har du noen gang hatt? *Sett kryss for hvert spørsmål. Oppgi også alderen ved hendelsen. Hvis det har skjedd flere ganger, hvor gammel var du **siste** gang.*

	JA	NEI	Alder siste gang
Lårhalsbrudd	☐	☐	År
Brudd ved håndledd/underarm....................	☐	☐	År
Nakkesleng (whiplash)	☐	☐	År
Skade som førte til sykehusinnleggelse	☐	☐	År

Har du eller har du hatt: *Kryss av «Ja» eller «Nei» for hvert spørsmål.*

	JA	NEI
Høysnue?	☐	☐
Kronisk bronkitt?	☐	☐
Benskjørhet (osteoporose)?	☐	☐
Fibromyalgi/fibrositt/kronisk smertesykdom?	☐	☐
Psykiske plager som du har søkt hjelp for?...........	☐	☐

Kryss av for de slektningene som har eller har hatt noen av sykdommene:

	Mor	Far	Bror	Søster	Barn
Hjerneslag eller hjerneblødning ..	☐	☐	☐	☐	☐
Hjerteinfarkt før 60 års alder	☐	☐	☐	☐	☐
Astma...	☐	☐	☐	☐	☐
Kreftsykdom...............................	☐	☐	☐	☐	☐
Sukkersyke (diabetes)	☐	☐	☐	☐	☐

Dersom det er sukkersyke i familien, oppgi alder da de fikk sukkersyke.

Mor	Far	Bror	Søster	Barn
år	år	år	år	år

	JA	NEI
Hoster du omtrent daglig i perioder?	☐	☐
Hvis Ja: Er hosten vanligvis ledsaget av oppspytt?.............................	☐	☐
Har du hatt slik hoste så lenge som i en 3 måneders periode i begge de to siste år?	☐	☐
Plagsomt tørre øyne - har du hatt denne følelsen daglig i mer enn 3 måneder?.......................	☐	☐
Har du ofte følelsen av sand på øynene	☐	☐
Tørrhet i munnen - har du hatt denne følelsen daglig i mer enn 3 måneder?.......................	☐	☐
Må du ofte drikke for å kunne svelge tørr mat?	☐	☐

VANLIGE PLAGER

Hvor ofte opplever du plagene som er nevnt nedenfor?

	Nesten aldri	Sjelden	Iblant	Ofte	Nesten alltid
Magesmerter	☐	☐	☐	☐	☐
Kvalme.................................	☐	☐	☐	☐	☐
Oppblåst mage	☐	☐	☐	☐	☐
Belegg på tungen eller vond smak i munnen	☐	☐	☐	☐	☐
Oppkast eller oppstøt..........	☐	☐	☐	☐	☐
Hyppige løse avføringer........	☐	☐	☐	☐	☐
Åndenød uten at du har anstrengt deg	☐	☐	☐	☐	☐
Brystsmerter	☐	☐	☐	☐	☐
Svie ved vannlating.............	☐	☐	☐	☐	☐
Ubehag i skrittet	☐	☐	☐	☐	☐
Misfarving av hud eller flekker på huden	☐	☐	☐	☐	☐
Ledd- eller muskelsmerter i armer eller ben	☐	☐	☐	☐	☐
Prikking eller stikking i armer eller ben	☐	☐	☐	☐	☐
Svie eller renning fra øyne eller nese	☐	☐	☐	☐	☐
Hodepine	☐	☐	☐	☐	☐
Svimmelhet.........................	☐	☐	☐	☐	☐
Uttalt tretthet	☐	☐	☐	☐	☐

	JA	NEI
Får du noen av plagene som er nevnt i forrige spørsmål, når du kjenner lukt av parfyme, stekelukt, eksos eller lignende?	☐	☐

ARBEID

Hva slags arbeidssituasjon har du nå?

Lønnet arbeid	☐
Heltids husarbeid	☐
Utdanning, militærtjeneste	☐
Arbeidsledig, permittert	☐

Hvor mange timer lønnet arbeid har du i uken? *Oppgi antall hele timer*................................. ☐☐

	JA	NEI
Har du skiftarbeid, nattarbeid eller går vakter?..................	☐	☐

Hvor ofte får du brukt dine evner i arbeidet?

Ofte	Noen ganger	Sjelden
☐	☐	☐

Hvis du er i lønnet eller ulønnet arbeid

Hvordan vil du beskrive arbeidet ditt?

For det meste stillesittende arbeid .... *(f.eks. skrivebordsarbeid, montering)*	☐
Arbeid som krever at du går mye? .... *(f.eks. ekspeditørarbeid, lett industriarbeid, undervisning)*	☐
Arbeid hvor du går og løfter mye?.. *(f.eks. postbud, pleier, bygningsarbeider)*	☐
Tungt kroppsarbeid?.. *(f.eks. skogsarb., tungt jordbruksarb., tungt bygningsarb.)*	☐

Hva er for tiden husholdningens årsinntekt før skatt? *(lønn og pensjon)*

Ingen inntekt	☐
Kr. 100,- – 49.900,-...	☐
Kr. 50.000,- – 99.900,-..	☐
Kr. 100.000,- – 149.900,-..	☐
Kr. 150.000,- – 199.900,-..	☐
Kr. 200.000,- – 299.900,-..	☐
Kr. 300.000,- – 399.900,-..	☐
Kr. 400.000,- – 499.900,-..	☐
Kr. 500.000,- – eller mer	☐

Har du i løpet av de siste 12 månedene hatt sykefravær?

	JA	NEI
Med egenmelding..	☐	☐
Med sykemelding fra lege	☐	☐

Dersom JA, hvor lenge til sammen?

Mindre enn 1 uke	1-2 uker	2-8 uker	Mer enn 8 uker
☐	☐	☐	☐

Mottar du for tiden noen av følgende offentlige ytelser?

	JA	NEI	Dersom JA, fra når Måned	År
Sykepenger/sykelønn/ rehabiliteringspenger	☐	☐	☐	☐
Ytelser under yrkesrettet attføring	☐	☐	☐	☐
Uførepensjon	☐	☐	☐	☐
Sosialstøtte	☐	☐	☐	☐
Arbeidsløshetstrygd	☐	☐	☐	☐
Etterlattepensjon..............................	☐	☐	☐	☐
Andre ytelser	☐	☐	☐	☐

Er det andre i din nærmeste familie som mottar noen av de følgende ytelser?

	Ektefelle/ samboer	Mor	Far
Sykepenger/sykelønn/ rehabiliteringspenger	☐	☐	☐
Yrkesrettet attføring	☐	☐	☐
Uføretrygd..	☐	☐	☐
Arbeidsløshetstrygd	☐	☐	☐

HELSE OG TRIVSEL

Her kommer noen flere spørsmål om hvordan du føler deg. For hvert spørsmål setter du kryss for ett av de fire svarene som beskriver dine følelser

Jeg føler meg nervøs og urolig.
☐ Mesteparten av tiden ☐ Mye av tiden
☐ Fra tid til annen ☐ Ikke i det hele tatt

Jeg gleder meg fortsatt over ting, slik jeg pleide før.
☐ Avgjort like mye ☐ Bare lite grann
☐ Ikke fullt så mye ☐ Ikke i det hele tatt

Jeg har en urofølelse, som om noe forferdelig vil skje.
☐ Ja, og noe svært ille ☐ Litt, bekymrer meg lite
☐ Ja, ikke så veldig ille ☐ Ikke i det hele tatt

Jeg kan le og se det morsomme i situasjoner.
☐ Like mye nå som før ☐ Avgjort ikke som før
☐ Ikke like mye nå som før ☐ Ikke i det hele tatt

Jeg har hodet fullt av bekymringer.
☐ Veldig ofte ☐ Av og til
☐ Ganske ofte ☐ En gang i blant

Jeg er i godt humør.
☐ Aldri ☐ Ganske ofte
☐ Noen ganger ☐ For det meste

Jeg kan sitte i fred og ro og kjenne meg avslappet.
☐ Ja, helt klart ☐ Ikke så ofte
☐ Vanligvis ☐ Ikke i det hele tatt

Jeg føler meg som om alt går langsommere.
☐ Nesten hele tiden ☐ Fra tid til annen
☐ Svært ofte ☐ Ikke i det hele tatt

Jeg føler meg urolig som om jeg har sommerfugler i magen.
☐ Ikke i det hele tatt ☐ Ganske ofte
☐ Fra tid til annen ☐ Svært ofte

Jeg bryr meg ikke lenger om hvordan jeg ser ut.
☐ Ja, jeg har sluttet å bry meg ☐ Kan hende ikke nok
☐ Ikke som jeg burde ☐ Bryr meg som før

Jeg er rastløs som om jeg stadig må være aktiv.
☐ Uten tvil svært mye ☐ Ikke så veldig mye
☐ Ganske mye ☐ Ikke i det hele tatt

Jeg ser med glede frem til hendelser og ting.
☐ Like mye som før ☐ Avgjort mindre enn før
☐ Heller mindre enn før ☐ Nesten ikke i det hele tatt

Jeg kan plutselig få en følelse av panikk.
☐ Uten tvil svært ofte ☐ Ikke så veldig ofte
☐ Ganske ofte ☐ Ikke i det hele tatt

Jeg kan glede meg over gode bøker, radio og TV.
☐ Ofte ☐ Ikke så ofte
☐ Fra tid til annen ☐ Svært sjelden

Har du i løpet av de siste 12 måneder hatt tanker om at det var bedre om du var død, eller hatt tanker om å skade deg selv på en eller annen måte? ....
JA ☐ NEI ☐

VANNLATING

Har du de siste 12 månedene vært plaget med akutt svie, smerte eller ubehag ved vannlating?
Nei ☐ 1-2 ganger ☐ 3-5 ganger ☐ Mer enn 5 ganger ☐

Hvor ofte har du vanligvis vannlating? .... *Antall ganger i døgnet* ☐☐

Må du vanligvis opp om natten for å late vannet?
Nei ☐ 1 gang ☐ 2 ganger ☐ Mer enn 2 ganger ☐

	JA	NEI
Føler du at du vanligvis får tømt blæren skikkelig ved vannlating?	☐	☐
Har du ufrivillig urinlekkasje?	☐	☐

Hvis «Nei», gå til neste avsnitt

Hvor ofte har du urinlekkasje?
Sjeldnere enn en gang per måned... ☐
En eller flere ganger per måned .... ☐
En eller flere ganger per uke.. ☐
Hver dag og/eller natt... ☐

Hvor mye urin lekker vanligvis hver gang?
Dråper eller lite ☐ Små skvetter ☐ Større mengder ☐

	JA	NEI
Har du lekkasje av urin i forbindelse med hosting, nysing, latter eller tunge løft?	☐	☐
Har du lekkasje av urin i forbindelse med sterk vannlatingstrang?	☐	☐

Hvor lenge har du hatt urinlekkasje?
0-5 år ☐ 5-10 år ☐ Mer enn 10 år ☐

ÅRSTIDSVARIASJONER I HUMØRET

Din følelse av velvære og dine aktiviteter: **I hvilken grad endrer dette seg med årstiden?**

	Ingen	Lett	Moderat	Markert	Sterkt
Søvnlengde	☐	☐	☐	☐	☐
Humør (velvære)	☐	☐	☐	☐	☐
Vekt	☐	☐	☐	☐	☐
Tiltakslyst	☐	☐	☐	☐	☐
Sosiale aktiviteter........	☐	☐	☐	☐	☐
Matlyst.........................	☐	☐	☐	☐	☐

SØVN

Har du merket følgende besvær siste 3 måneder?

	Aldri	Sjelden *Noen ganger pr. år*	Iblant *Noen ganger pr. mnd.*	For det meste *Flere ganger pr. uke*	Alltid
Vanskelig for å sovne............................	☐	☐	☐	☐	☐
Gjentatte oppvåkninger med vansker for å sovne igjen........	☐	☐	☐	☐	☐
Våknet opp for tidlig (endelig oppvåkning)	☐	☐	☐	☐	☐
For lite søvn (minst 1 time under ditt søvnbehov)	☐	☐	☐	☐	☐
Snorking (ifølge andre)	☐	☐	☐	☐	☐
Pustepauser under søvn (ifølge andre)	☐	☐	☐	☐	☐
Trett/søvnig på arbeid eller i fritiden................................	☐	☐	☐	☐	☐
Utilsiktede søvnepisoder («hodet dupper») - på arbeid	☐	☐	☐	☐	☐
- i fritiden...................................	☐	☐	☐	☐	☐
Behov for å kjempe mot søvnen for å holde deg våken....	☐	☐	☐	☐	☐
Plutselig tap av muskelkraft (f.eks. «knekker i knærne») ved følelsesmessige reaksjoner (som f.eks. latter, sinne, frykt)....	☐	☐	☐	☐	☐

Hvordan syns du at du sover totalt sett?

Veldig bra.. ☐
Ganske bra .... ☐
Hverken bra eller dårlig .... ☐
Ganske dårlig .... ☐
Veldig dårlig .... ☐

Hvor ofte er du plaget av søvnløshet?

Aldri, eller noen få ganger i året .... ☐
1 - 2 ganger i måneden .... ☐
Omtrent en gang i uken .... ☐
Mer enn en gang i uken .... ☐

Har du siste året vært plaget av søvnløshet slik at det har gått ut over arbeidsevnen? ....
JA ☐ NEI ☐

Når går du normalt til sengs for å sove?

i arbeidsuken:.................................*kl.:* ☐☐ , ☐☐

i fritiden: ....*kl.:* ☐☐ , ☐☐

Når våkner du normalt opp (endelig oppvåkning)?

i arbeidsuken:.................................*kl.:* ☐☐ , ☐☐

i fritiden: ....*kl.:* ☐☐ , ☐☐

Hvor lenge ligger du våken før du sovner?

i arbeidsuken:................................. ☐☐☐ *minutter*

i fritiden: .... ☐☐☐ *minutter*

Hvor mye søvn trenger du? .... ☐☐ *timer* ☐☐ *min.*

Hvor ofte tar du deg en blund på dagtid?

Aldri .... ☐
Sjelden *(noen ganger pr. år)* .... ☐
Iblant *(noen ganger pr. måned)* .... ☐
For det meste *(flere ganger i uken)* .... ☐
Alltid *(hver dag)* .... ☐

Hvis du tar deg en blund, hvor lenge bruker den å vare?........... ☐☐ *timer* ☐☐ *min.*

Er du morgen- eller kveldsmenneske?

Utpreget morgenmenneske .... ☐
Mer morgen- enn kveldsmenneske .... ☐
Hverken eller .... ☐
Mer kvelds- enn morgenmenneske .... ☐
Utpreget kveldsmenneske .... ☐

Mener du at du får tilstrekkelig med søvn?

Ja, absolutt tilstrekkelig .... ☐
Ja, stort sett tilstrekkelig .... ☐
Nei, noe utilstrekkelig .... ☐
Nei, klart utilstrekkelig .... ☐
Nei, langt fra tilstrekkelig .... ☐

Hvis du bruker sovemedisiner, føler du at de hjelper?

Veldig mye .... ☐
Ganske bra .... ☐
Litt... ☐
Ganske dårlig .... ☐
Ikke i det hele tatt .... ☐

Hvis du bruker sovemedisiner, hvor lenge har du brukt slike?

Mer enn 5 år .... ☐
1 - 5 år .... ☐
3 - 12 måneder .... ☐
1 - 3 måneder .... ☐
Under 1 måned... ☐

SVANGERSKAP OG FØDSEL

Hvor gammel var du da du fikk menstruasjon første gang?

Jeg var ☐☐ *år gammel*

Hvis du ikke lenger har naturlig menstruasjon, hvor gammel var du da den sluttet?

Jeg var ☐☐ *år gammel*

T

	Ja	Nei	Usikker
Er du gravid nå?	☐	☐	☐

Hvor mange barn har du født tidligere?

Jeg har født ☐☐ *barn*

Hvis du har født, fyll ut for hvert barn, barnets fødselsår og omtrent antall måneder du ammet hvert barn.

Barn	Fødselsår	Antal måneder med amming	
1. Barn	**19** ☐☐	☐☐	*måneder*
2. Barn	**19** ☐☐	☐☐	*måneder* T
3. Barn	**19** ☐☐	☐☐	*måneder*
4. Barn	**19** ☐☐	☐☐	*måneder*
5. Barn	**19** ☐☐	☐☐	*måneder*
6. Barn	**19** ☐☐	☐☐	*måneder*

Bruker du eller har du brukt:	Nå	Før	Aldri
P-pille (også minipille)	☐	☐	☐
Hormonspiral	☐	☐	☐
Østrogen (tabletter eller plaster).........	☐	☐	☐
Østrogen (krem eller stikkpiller)..........	☐	☐	☐

Hvis du bruker p-pille, hormonspiral eller østrogen, hvilket merke bruker du?

☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Ikke skriv i disse rutene ➢ ☐☐ ☐☐

T

VOLD

Med vold mener vi slag, spark, dytting, lugging, knivstikking og/eller andre typer fysisk vold som ble påført deg av en annen, kjent eller ukjent person.

T

	JA	NEI
Har du det siste året vært utsatt for fysisk vold?............	☐	☐
Dersom du har vært utsatt for vold, oppsøkte du lege eller sykehus på grunn av skaden?	☐	☐

Dersom du har vært utsatt for vold, hvilken type vold var dette?

☐ Slagsmål der du selv deltok ☐ Ran/overfall ☐ Annet

☐ Mishandling ☐ Blind/tilfeldig vold

MEDISINBRUK

Har du i løpet av det siste året brukt noen av følgende midler daglig eller nesten daglig?
Angi hvor mange måneder du brukte dem.
Sett 0 hvis du ikke har brukt noen av midlene.

Legemidler

Smertestillende..	*Antall måneder*	☐☐
Sovemedisin	*Antall måneder*	☐☐
Beroligende midler....................................	*Antall måneder*	☐☐
Midler mot depresjon	*Antall måneder*	☐☐
Allergimedisin	*Antall måneder*	☐☐
Astmamedisin	*Antall måneder*	☐☐

Kosttilskudd

Jerntabletter..	*Antall måneder*	☐☐
Vitamintilskudd	*Antall måneder*	☐☐
Tran..	*Antall måneder*	☐☐

VENNER

Hvor mange gode venner har du? *Regn med de du kan snakke fortrolig med og som kan gi deg hjelp når du trenger det. Tell ikke med de du bor sammen med, men ta med andre slektninger.*

Jeg har ☐☐ *gode venner*

T

	JA	NEI
Føler du at du har nok gode venner?	☐	☐

Hvor ofte tar du vanligvis del i foreningsvirksomhet som f.eks. idrettslag, politiske lag, religiøse eller andre foreninger?

Aldri, eller noen få ganger i året	☐
1-3 ganger i måneden	☐
Omtrent en gang i uken	☐
Mer enn en gang i uken...	☐

DIN VURDERING AV DIN ARBEIDSPLASS

Ta stilling til de følgende påstandene om din arbeidsplass.

Det er en rolig og behagelig stemning på min arbeidsplass.

☐ Stemmer helt   ☐ Stemmer ganske bra

☐ Stemmer ikke særlig   ☐ Stemmer slett ikke

Det er godt samhold på arbeidsplassen.

☐ Stemmer helt   ☐ Stemmer ganske bra

☐ Stemmer ikke særlig   ☐ Stemmer slett ikke

Mine kolleger stiller opp for meg (gir meg støtte).

☐ Stemmer helt   ☐ Stemmer ganske bra

☐ Stemmer ikke særlig   ☐ Stemmer slett ikke

På jobben har de forståelse for at jeg kan ha en «dårlig» dag.

☐ Stemmer helt   ☐ Stemmer ganske bra

☐ Stemmer ikke særlig   ☐ Stemmer slett ikke

Jeg kommer godt overens med mine overordnede.

☐ Stemmer helt   ☐ Stemmer ganske bra

☐ Stemmer ikke særlig   ☐ Stemmer slett ikke

Jeg trives godt med mine arbeidskamerater.

☐ Stemmer helt   ☐ Stemmer ganske bra

☐ Stemmer ikke særlig   ☐ Stemmer slett ikke

⊤

Ta stilling til følgende påstander om ditt arbeid:

Krever arbeidet ditt at du må arbeide veldig hurtig?

☐ Ja, ofte   ☐ Ja, iblant

☐ Nei, sjelden   ☐ Nei, så godt som aldri

Krever arbeidet ditt at du må arbeide svært hardt?

☐ Ja, ofte   ☐ Ja, iblant

☐ Nei, sjelden   ☐ Nei, så godt som aldri

Krever arbeidet ditt for stor arbeidsinnsats?

☐ Ja, ofte   ☐ Ja, iblant

☐ Nei, sjelden   ☐ Nei, så godt som aldri

Har du tilstrekkelig tid til å rekke alle arbeidsoppgavene?

☐ Ja, ofte   ☐ Ja, iblant

☐ Nei, sjelden   ☐ Nei, så godt som aldri

Møter du ofte motstridende krav i arbeidet ditt?

☐ Ja, ofte   ☐ Ja, iblant

☐ Nei, sjelden   ☐ Nei, så godt som aldri

Har du anledning til å lære noe nytt i arbeidet ditt?

☐ Ja, ofte   ☐ Ja, iblant

☐ Nei, sjelden   ☐ Nei, så godt som aldri

Krever arbeidet ditt nøyaktighet?

☐ Ja, ofte   ☐ Ja, iblant

☐ Nei, sjelden   ☐ Nei, så godt som aldri

Krever arbeidet ditt oppfinnsomhet?

☐ Ja, ofte   ☐ Ja, iblant

☐ Nei, sjelden   ☐ Nei, så godt som aldri

Innebærer arbeidet ditt at du gjør det samme om og om igjen?

☐ Ja, ofte   ☐ Ja, iblant

☐ Nei, sjelden   ☐ Nei, så godt som aldri

Har du mulighet til selv å bestemme *hvordan* arbeidet skal utføres?

☐ Ja, ofte   ☐ Ja, iblant

☐ Nei, sjelden   ☐ Nei, så godt som aldri

Har du mulighet til selv å bestemme *hva* som skal gjøres i arbeidet ditt?

☐ Ja, ofte   ☐ Ja, iblant

☐ Nei, sjelden   ☐ Nei, så godt som aldri

⊤

⊤

Takk enda en gang for at du har tatt deg tid til å fylle ut dette skjemaet.

Ditt bidrag vil være verdifullt for forståelsen av den betydningen mange faktorer har for menneskelig helse og trivsel.

Vennlig hilsen

Helseundersøkelsen i Hordaland 97-99
Statens helseundersøkelser

HUSK

Paper I

Occupational Differences in Levels of Anxiety and Depression: The Hordaland Health Study

Abstract

The literature on anxiety and depression in work life is scarce. This study examined if and how levels of anxiety and depression differed between occupations. The study encompassed 17384 workers with occupations classified according to ISCO-88 (COM) from the population- based Hordaland Health Study. Levels of anxiety and depression were assessed by the anxiety and depression subscales of the Hospital Anxiety and Depression Scale (HADS-A and HADS-D, respectively). Main analytical method was univariate analysis of variance. Both HADS-A and HADS-D scores differed significantly between occupaional groups. HADS levels showed a distinct and inverse association with skill levels, most strongly observed for HADS-D scores in men. The relationship between skill levels and depression caseness was equally strong. Elementary occupations consistently showed higher-than-average HADS scores. The strength of the associations between depression score/caseness and skill levels are of clinical significance. Screening for depression should be considered in low-skill occupations.

Paper II

Farmers are at risk for anxiety and depression: the Hordaland Health Study

Abstract

Aims To examine whether, and why, farmers and non-farmers differ regarding levels of anxiety and depression.

Methods The study encompassed 17 295 workers age 40–49 years, including 917 farmers, from the population-based Hordaland Health Study 1997–99 (HUSK). Levels of anxiety and depression were assessed by the Hospital Anxiety and Depression Scale (HADS-A and HADS-D, respectively). Self-reported information on various work-related factors, demographics, lifestyle and somatic health problems was included. The main analytical methods were univariate analysis of variance (ANOVA) /Kruskal–Wallis test, χ^2/Fisher's exact test and logistic regression.

Results Compared with non-farmers, farmers had higher levels and prevalences of depression, particularly the male farmers, who also had higher anxiety levels. Among men, farmers reported longer work hours, lower income, higher psychological job demands and less decision latitude compared with non-farmers. Farmers had physically heavier work and a lower level of education than non-farmers. Generally, the differences were largest between full-time farmers and non-farmers. Differences in anxiety and depression levels between male full-time farmers and non-farmers could be explained by the farmers' longer work hours, physically harder work and lower income.

Conclusions Farming is associated with increased levels of anxiety and increased levels and prevalences of depression. As regards depression, preventative measures and screening for cases in need of treatment should be strongly considered.

Key words

Anxiety; depression; farmers; Hospital Anxiety and Depression Scale (HADS)

Paper III

The Swedish Demand-Control-Support Questionnaire (DCSQ): factor structure, item analyses and internal consistency in a large population

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Abstract

Aim: This paper examined the psychometric properties of the Swedish Demand-Control-Support Questionnaire (DCSQ), which is a shorter and modified version of Karasek's Job Content Questionnaire (JCQ).

 Methods: The study encompassed 5227 workers born 1953-57 from the population-based Hordaland Health Study. DCSQ, a 17 item questionnaire, covers psychological demands, decision latitude and social support in the work place. The workers were manually classified according to Standard Classification of Occupations. The main statistical methods were principal component analyses, and estimation of internal consistency and the subscales' shared variance by Cronbach's coefficient α and Pearson's correlation coefficients, respectively.

 Results: The study gave support to the tri-dimensional factor structure of DCSQ. Decision latitude tended to split into skill discretion and decision authority in skill level homogeneous samples. The specificity of the item loadings was satisfactory except for 'conflicting demands'. The inter-correlation of the three main subscales was weak. The internal consistency of the subscales was generally satisfactory.

 Conclusions: The psychometric properties of DCSQ are satisfactory. Being shorter and easier to use than the more comprehensive JCQ, DCSQ represents an important alternative, particularly if respondent burden and data-collection costs need to be minimised.

Key words: Job Demand-Control(-Support) model, Job Content Questionnaire, Demand-Control(-Support) Questionnaire

Introduction

The Job Demand-Control(-Support) model has dominated research on occupational stress for more than 20 years. Although both the model and methodological issues have been criticised (1-4), the literature gives considerable support to central aspects of the model, also when major public health problems such as cardiovascular disease and anxiety and depression are outcome variables (5, 6). A much debated issue in occupational stress research concerns how to measure psychosocial work environment, whether by questionnaires, imputation of job characteristics scores, or by external assessment (7). In spite of inherent weaknesses such as self-report bias, self-report questionnaires have been extensively used. They are inexpensive and easy to administer, thus enabling the researcher to do studies of large samples efficiently (8). Most importantly, questionnaires have repeatedly demonstrated their usefulness in examining the job strain model. They constitute an important part of a multi-method approach, which is the preferable research strategy when examining the relationship between job strain and health outcomes (1, 6-8).

The most widely used questionnaire for assessing (psychological) demands, (decision) latitude and (social) support in the work place, is the Job Content Questionnaire (JCQ), which has been validated in several languages (5, 9). There exists another questionnaire which also is widely used, particularly in Scandinavian countries, namely the Swedish Demand-Control (-Support) Questionnaire [DC(-S)Q, table I] (5, 7, 8). The content of the DCQ items is also covered by JCQ. However, the response grading of the demands and latitude subscales in DC(-S)Q is frequency-based, while that of JCQ is intensity-based. The support items of DCSQ are oriented toward the atmosphere at the work-site, while the JCQ support questions are more objective and instrumental in nature (7). Compared to JCQ, DCSQ is shorter (17 items, while the item numbers of the corresponding three subscales in JCQ are 22 for the 'core' version and 26 for the 'full' JCQ) and has fewer dimensions. This makes DCSQ easier to include in epidemiological studies, thus representing an alternative to the more extensive JCQ. In spite of its frequent use, the only published examination of the psychometric properties of DCSQ (apart from reliability estimations in specific occupations and industries) was done as part of 'The Stockholm Survey 1', where reliability and validity mainly were examined in a group of 30 physician's secretaries (10).

On this background, the aim of the present study was to examine the factor structure, inter-correlation, homogeneity of subscales and internal consistency of DCSQ in Norwegian translation, based on data from a large Norwegian population-based sample of male and female workers living and working in both urban and rural settings, and belonging to a great

diversity of occupational groups. Examination across different levels of skill, education and depression was also done, because these factors theoretically could influence the results.

Material and Methods

Study population

The Hordaland Health Study 1997-99 (HUSK) was conducted as a collaboration between the National Health Screening Service, the University of Bergen and local health services. The study population included the 29400 individuals living in Hordaland county of Western Norway born between 1953 and 1957. A total of 8598 men and 9983 women participated, yielding a participation rate of 57% for men and 70% for women.

Data collection in HUSK was performed in two steps. The first step, which was identical for all participants, included a self-administered questionnaire and a health examination. In the second step, the participants were given one of four different questionnaires. About half of the men and 75% of the women were given questionnaires that included DCSQ. The present study encompassed only workers, defined as having worked at least 100 income giving hours the preceding year, who answered all the 17 items of DCSQ. This comprised 5227 individuals, constituting 57% of the workers who were given this questionnaire.

Measurements

DCSQ was developed by Theorell et al, based on the Demand-Control (-Support) Model by Karasek and Theorell (10-14). The demands and latitude subscales represent a shortened and modified version of JCQ (7, 8). The demands subscale has five items. Except for D5, the questions deal with quantitative aspects (8). The central concept in demands is mental alertness or arousal caused by task requirements or work load (15). The latitude subscale consists of six items, four on intellectual discretion (skill discretion) and two on authority over decisions (decision authority). Because of a translation error from Swedish into Norwegian, one of the decision latitude/skill discretion items had to be excluded ('Does your work require skills?'). The support subscale has six items, and its response grading is intensity-based. Each item is scored on a four-point scale from one to four, corresponding to the four response categories. The item scores are added, giving subscale scores from 5 (minimum level) to 20 (maximum level) for demands and latitude, and from 6 to 24 for support.

The self-administered questionnaires included an open-ended question of main occupation that was manually classified according to Standard Classification of Occupations,

ISCO-88 (16). ISCO-88 has a four-level hierarchical structure, based on skill level, i.e., which technical and formal skills that are normally required. For the 10 major occupational groups (MOGs), the skill level is decreasing from group 1 through group 9.

The Hospital Anxiety and Depression Scale (HADS) has been found to perform well in assessing symptom load and caseness of anxiety disorder and depression in both somatic, psychiatric and primary care patients as well as in the general population (17). Caseness (i.e., 'possible cases' of anxiety and/or depressive disorders) is defined as a score >= 8 on the HADS subscales for anxiety (HADS-A) and/or depression (HADS-D), as this cut-off level has been shown to give an optimal balance between sensitivity and specificity on receiver operating curves (17).

Weighting procedures

Some 50% of the men and 75% of the women that participated in the first step of HUSK were given DCSQ. Thus weighting was performed to approximate the gender distribution of the participants of the second step to the gender distribution of the participants of the first step.

Statistics

Different sets of principal component analyses (PCA) were performed on the demands, latitude and support subscales, with varying criteria for the number of factors. Results using oblique rotation (Oblimin) are reported, because this method represents the clustering of variables more accurately than orthogonal rotation, and also provides information about the extent to which the factors are actually correlated with each other (18). Thus the tenability of the orthogonality assumption can be determined (19). An oblique model has also been shown to give a better fit in a confirmatory factor analysis (20, 21). However, because JCQ validation studies have shown low correlation between demands and latitude, analyses with orthogonal rotation (Varimax) were also performed (22). Factor loadings greater than .40 were considered as acceptable loadings on a component or factor (18, 19, 21-23). Loadings of items with absolute values of .30 or greater on additional factors were considered relevant and viewed as 'shared high loadings' (18, 21).

In order to test the stability of the factor structure obtained, the analyses were repeated according to gender and in randomly split halves of the sample (table II). Stratification on gender was done due to gender differences both in the distribution pattern of occupations (24) and in levels of demands, latitude and support (13). We also repeated the factor analyses according to skill level/MOGs (table III). This was motivated by studies showing differences

in levels of demands and latitude between occupations (9, 13), particularly the finding that lower ranked occupational grades of the ISCO were associated with lower mean demands and latitude scores compared to higher (21).

Pearson's correlation coefficients were calculated and squared for estimation of the subscales' shared variance. The internal consistency of the subscales was calculated by Cronbach's coefficient α. It has been suggested that an α value should be within the range of .65-.90 to consider a scale to be reasonably consistent (21). However, according to Stewart et al. (19), citing Helmstadter (1964), reliability values of .50 or above is considered acceptable for group comparisons.

Ethics

The study protocol of the HUSK study was cleared by the Regional Committee for Medical Research Ethics of Western Norway and approved by the Norwegian Data Inspectorate.

Results

Factor structures

In PCA with the number of factors limited to three, a three-factor solution emerged where the demands, latitude and support items loaded on separate factors. This result was found in the total sample as well as in all the defined sub-samples, and was also confirmed in the analysis of randomly split halves of the samples. Eigenvalues for the demands, latitude and support subscales in the total sample were 3.65, 2.61 and 2.63, respectively. Accordingly, the three-factor solution explained 56% of the total variance (table II).

When performing PCA with the number of factors defined by eigenvalues >= 1.00, a three-factor solution was maintained in the total sample and in all the defined sub-samples, except in MOGs 0-4 for men and MOGs 5-9 for total sample and women, where latitude split into skill discretion (DL1-DL3/SD1-3) and decision authority (DL4-DL5/DA1-2) (table III). In MOGs 0-4 for men, D5 was grouped with skill discretion.

PCA done on each subscale separately, with the number of factors predefined by eigenvalues >= 1.00, gave only single-factor solutions in both the total sample and in all sub-samples, except for latitude in MOGs 5-9 for women, which split into skill discretion and decision authority.

When PCA was performed in a sample of 'possible' depression cases (i.e., HADS-D

>= 8; n = 402) with the number of factors defined by eigenvalues >= 1.00, the three-factor solution was maintained.

Analyses using orthogonal rotation (Varimax) basically gave the same results, but tended to give lower eigenvalues and factor loadings.

Inter-correlation of the subscales

The demands and latitude subscales shared in average about 1% of the variance (tables II and III), while the corresponding numbers for the demands – support and latitude – support pairs were some 6% and 5%, respectively. The differences in shared variances for the three pairs between the samples were modest. The skill discretion and decision authority subscales shared about 15% of the variance (13.1-17.3%).

Homogeneity of the subscales

In the samples where three factors emerged, all items loaded highest on the factor to which they theoretically belonged. However, in MOGs 0-4 for men, item D5 loaded highest on skill discretion (table III). In the samples where latitude split into two factors, DL1-3 loaded highest on skill discretion while DL4-5 loaded highest on decision authority. For items with 'shared high loadings', the following patterns were found: D5 consequently loaded high on support, while S1 in most samples loaded high on demands. When the total sample was divided by MOGs (table III), D5 also loaded high on skill discretion, while DL2 loaded high on decision authority. All the items D4, DL1, DL2 and S1, showing 'shared high loadings', had high loadings on the factors to which they theoretically belonged.

Internal consistency

The internal consistency of the subscales demands, latitude, decision authority and support, as calculated by Cronbach's α, was in the range of .70-.85, except for latitude in two sub-samples (table IV). The α value of skill discretion for the total sample was .62, ranging from .56 to .64 in the different sub-samples.

The internal consistency of all the subscales in both 'possible cases' of depression and those with education less than A-levels (high school) was almost identical to that of the whole sample.

Discussion

This large population-based study gave support to the tri-dimensional factor structure of

DCSQ, comprising the separate dimensions of demands, latitude and support. When the sample was divided by MOGs, latitude tended to split into skill discretion and decision authority. The inter-correlation of the three main subscales was weak, as they shared only 1-6% of the variance. Except for D5's rather weak specificity for demands, the specificity of the item loadings was satisfactory. The internal consistency of support, demands, latitude and decision authority as calculated by Cronbach's α, was satisfactory (.67-.85), while that of skill discretion was acceptable (.56-.64). The DCSQ showed the same psychometric properties in a sub-sample of depressed individuals as in the main sample.

The exclusion of the decision latitude item 'Does your work require skills?' represents a limitation of the study. However, the corresponding item has not shown low loadings on the JCQ decision latitude factor (21, 22, 25). It is, therefore, probable that the inclusion of a correct translation of the item would increase Cronbach's α for the latitude subscale.

The narrow age range in our study reduces the generalisability of the findings. On the other hand, due to the large sample size and the age homogeneity, a more thorough investigation of subgroups was possible. It should also be noted that demands, latitude and support scores have been found to vary little with age (21, 22). An exception is the finding from a Swedish study that latitude increased rapidly during the first years of a person's career, particularly before the age of 25 years (8).

Self-reports on demands, latitude and support may be biased towards the negative in depressed individuals (1, 26). The moderate participation rate could imply that depressed individuals were under-represented in our sample (27, 28). However, the three-factor solution was maintained when PCA was performed in a sub-sample of 'possible' depression cases, indicating that the factor structure is not affected by the prevalence of depression.

A controversial issues concerning the Job Demand-Control(-Support) model is the concept of decision latitude, which is a combination of the theoretically distinct constructs skill discretion and decision authority (1, 2). The original argument for the combination is the finding that the two parts generally are highly correlated in most occupations, since "highly skilled work that allows little decision authority appears to be a relatively rare combination in practice" (23). This also applied for our study. However, the correlations between the two components can show substantial differences across occupational groups (5).

Latitude, which seems to be strongly determined by the content of work, varies much more across occupational groups than do demands and support, which to a greater extent

reflect local work site conditions and individual perception (5). Lack of decision latitude appears to be "the primary work-related risk factor" (13, 29), and as such it is an advantage that latitude distinguishes well between different occupations. However, the considerable variation in latitude scores between occupations may result in low internal homogeneity of this factor in analyses of separate occupational groups (10). This was the case in 'The Stockholm Survey 1', with Cronbach's α for skill discretion less than .40 for both occupational groups examined (30), as well as in our study. This phenomenon is caused by a restriction of variance in latitude scores. It was, therefore, as expected when we found latitude to appear as a separate factor in occupationally heterogeneous samples, while in some occasions it split into skill discretion and decision authority when the sample was divided by MOGs (a division which created two different groups as regards skill level, education, income etc). However, internal consistency for latitude was only slightly lowered by this division (table IV).

It may be argued whether it is preferable to use the latitude or the skill discretion/ decision authority subscales. Pelfrene et al. (21) found a high correlation between skill discretion and decision authority (r = .63), thus concluding that in their study, with its heterogeneous set of occupations, a clear distinction between the two subscales was not indicated. Accordingly, we suggest that skill discretion and decision authority are preferred when latitude naturally splits into these two subscales, which tends to happen in latitude homogeneous samples, particularly when specific occupational groups are examined. However, it seems reasonable to use latitude when studying occupationally heterogeneous samples.

Item D5 showed low specificity for demands. Also JCQ gives low loadings for the "conflicting demands" question on the demands subscale (9, 21). This is a problematic item, as "role conflict…are similar to low decision latitude in that they imply conflicting authority structures at the task level that the worker is powerless to resolve" (13). The use of this item should probably be re-evaluated in both questionnaires.

The low inter-correlation between the three main subscales of DCSQ supports the conclusion that DCSQ comprises three separate dimensions. A low, positive correlation between demands and latitude, which was highest in men, has also been found in studies examining the psychometric properties of JCQ (9, 21, 22).

The internal consistency of the DCSQ subscales was satisfactory, even in the depressed and those with low education, two groups for whom reliability tends to be poorer compared to the general population (19).

Conclusion

The psychometric properties of DCSQ are satisfactory, and the questionnaire can be safely used across different levels of skill, education and depression. Because latitude tends to split into skill discretion and decision authority in skill level homogeneous samples, we suggest that the latter two subscales are preferred to latitude when specific occupations are examined. The demands and latitude subscales of DCSQ and JCQ appear to be very similar. A comparative study of the two questionnaires would be helpful in order to obtain information on corresponding strengths and weaknesses. Notwithstanding, DCSQ appears to be an important alternative to JCQ. Being shorter and easier to use, DCSQ is of particular interest when respondent burden and data-collection costs need to be minimized.

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Table I. The Swedish Demand-Control-Support Questionnaire (DCSQ)[a]

Subscale name and item number	Item text
Psychological demands (D)	
D1	Does your job require you to work very fast?
D2	Does your job require you to work very hard?
D3	Does your job require a too great work effort?
D4	Do you have sufficient time for all your work tasks?
D5	Do conflicting demands often occur in your work?
Decision latitude (DL)[b]	
DL1/SD1	Do you have the opportunity to learn new things in your work?
DL2/SD2	Does your job require creativity?
DL3/SD3	Does your job require doing the same tasks over and over again?
DL4/DA1	Do you have the possibility to decide for yourself *how* to carry out your work?
DL5/DA2	Do you have the possibility to decide for yourself *what* should be done in your work?
Social support (S)[c]	
S1	There is a quiet and pleasant atmosphere at my place of work.
S2	There is good collegiality at work.
S3	My co-workers (colleagues) are there for me (support me).
S4	People at work understand that I may have a "bad" day.
S5	I get along well with my supervisors.
S6	I get along well with my co-workers.

[a]The translation into English from the Norwegian version was done by the authors, and is not authorised. Questions are answered on a four-point scale from 1 to 4. All item scores except D4 and DL3 are reversed before summation.

[b]SD: Skill discretion; DA: Decision authority. The decision latitude (skill discretion) item "Does your job require skills?", was excluded from the study due to a translation error.

[c]A combination of supervisor and co-worker support.

Table II. Principal component analysis (oblique rotation) of the Swedish Demand-Control-Support Questionnaire

Item	Whole sample[a]			Men			Women			Whole sample, split half 1[a, b]			Whole sample, split half 2[a, b]		
	F1	F2	F3	F1	F2	F3	F1	F2	F3	F1	F2	F3	F1	F2	F3
Psychological demands (D) subscale															
D1	**.73**	-.09	-.03	**.74**	-.01	-.01	**.72**	-.16	-.05	**.73**	.10	-.01	**.73**	-.08	-.05
D2	**.77**	.05	-.05	**.77**	-.10	-.02	**.76**	.00	-.07	**.76**	-.05	-.04	**.77**	.06	-.07
D3	**.77**	.11	-.14	**.75**	-.11	-.13	**.78**	.11	-.15	**.76**	-.11	-.14	**.77**	.12	-.14
D4	**.64**	.18	-.27	**.62**	-.17	-.26	**.67**	.17	-.28	**.64**	-.15	-.26	**.64**	.21	-.29
D5	**.53**	.22	-.37	**.48**	-.18	-.36	**.57**	.23	-.37	**.53**	-.19	-.36	**.52**	.26	-.39
Decision latitude (DL) subscale															
DL1 / SD1[c]	.14	**.61**	.26	.17	**-.65**	.24	.11	**.59**	.27	.15	**-.60**	.25	.13	**.62**	.26
DL2 / SD2	.24	**.71**	.06	.32	**-.67**	.06	.19	**.73**	.07	.24	**-.70**	.09	.24	**.72**	.04
DL3 / SD3	.03	**.63**	-.01	.00	**-.59**	.00	.05	**.65**	.00	.00	**-.63**	-.02	.05	**.63**	.00
DL4 / DA1[c]	-.06	**.76**	.17	-.02	**-.77**	.20	-.09	**.75**	.17	-.06	**-.75**	.17	-.05	**.78**	.17
DL5 / DA2	-.02	**.74**	.18	.08	**-.75**	.19	-.10	**.74**	.19	-.01	**-.74**	.18	-.03	**.75**	.18
Social support (S) subscale															
S1	-.31	.13	**.64**	-.27	-.14	**.62**	-.34	.10	**.68**	-.33	-.15	**.63**	-.29	.12	**.66**
S2	-.11	.11	**.82**	-.08	-.10	**.82**	-.14	.11	**.82**	-.12	-.10	**.82**	-.11	.12	**.82**
S3	-.08	.13	**.80**	-.06	-.16	**.78**	-.09	.13	**.81**	-.09	-.14	**.79**	-.06	.11	**.80**
S4	-.14	.15	**.71**	-.12	-.17	**.69**	-.15	.18	**.73**	-.15	-.14	**.71**	-.13	.15	**.72**
S5	-.11	.14	**.68**	-.10	-.15	**.67**	-.11	.15	**.68**	-.07	-.15	**.68**	-.14	.13	**.68**
S6	-.04	.08	**.77**	-.02	-.09	**.75**	-.07	.08	**.78**	-.03	-.09	**.77**	-.05	.08	**.76**
Eigenvalue	2.63	2.61	3.65	2.56	2.56	3.51	2.73	2.62	3.80	2.63	2.52	3.59	2.63	2.69	3.71
Explained variance	16%	16%	23%	16%	16%	22%	17%	16%	24%	16%	16%	22%	16%	17%	23%
n		5227			1938			3289			2613			2614	
Gender (females)		62.9%			0%			100%			62.7%			63.1%	
Sub-scale correlation,	D/S	DL/S	D/DL	DL/S	D/S	D/DL	D/S	DL/S	D/DL	D/S	DL/S	D/DL	D/S	DL/S	D/DL
shared variance (R^2)	.061	.047	.013	.053	.047	.027	.071	.051	.004	.059	.048	.010	.063	.045	.016

[a]Weighted for the different gender representation. See text for details. Mean age (s.d.): 42.0 years (1.4).
[b]Randomly selected split halves of total material.
[c]SD: Skill discretion; DA: Decision authority.

Table III. Principal component analysis (oblique rotation) of the Swedish Demand-Control-Support Questionnaire for major occupational groups[a]

Item	Major occupational groups 0-4[b]							Major occupational groups 5-9[c]						
	Men				Women			Men			Women			
	F1	F2	F3	F4	F1	F2	F3	F1	F2	F3	F1	F2	F3	F4
Psychological demands (D) subscale														
D1	**.74**	-.04	-.02	.01	**.70**	.18	.01	**.75**	.04	-.05	**.76**	.15	.13	-.12
D2	**.78**	-.13	-.07	-.03	**.75**	-.03	-.03	**.78**	-.10	-.02	**.79**	.04	.04	-.13
D3	**.77**	-.16	-.01	-.12	**.78**	-.14	-.12	**.73**	-.01	-.15	**.78**	-.11	.06	-.17
D4	**.62**	-.32	.17	-.24	**.70**	-.15	-.24	**.56**	-.07	-.29	**.61**	-.18	.08	-.31
D5	**.40**	**-.47**	.23	-.31	**.59**	-.17	-.32	**.50**	-.05	-.42	**.51**	-.37	.09	-.43
Decision Latitude (DL) subscale														
DL1 / SD1[d]	.12	**-.65**	-.29	.21	.16	**-.51**	.32	.13	**-.64**	.31	-.03	**-.70**	-.24	.30
DL2 / SD2	.24	**-.60**	-.35	.10	.22	**-.72**	.08	.35	**-.71**	.04	.12	**-.72**	-.41	.11
DL3 / SD3	-.07	**-.72**	-.21	.04	.09	**-.66**	.02	-.12	**-.51**	-.05	-.14	**-.69**	-.15	.06
DL4 / DA1[d]	.02	-.32	**-.83**	.17	-.08	**-.79**	.16	-.07	**-.78**	.22	-.07	-.19	**-.90**	.19
DL5 / DA2	.10	-.24	**-.84**	.13	-.10	**-.74**	.18	.05	**-.75**	.25	-.07	-.26	**-.89**	.21
Social support (S) subscale														
S1	-.23	.09	-.32	**.60**	-.32	-.11	**.69**	-.32	-.11	**.63**	-.36	.08	-.28	**.67**
S2	-.03	.05	-.18	**.81**	-.10	-.10	**.83**	-.14	-.12	**.83**	-.20	-.05	-.24	**.81**
S3	-.07	-.13	-.09	**.80**	-.08	-.13	**.82**	-.08	-.15	**.77**	-.13	-.14	-.14	**.79**
S4	-.09	-.06	-.15	**.70**	-.13	-.19	**.73**	-.17	-.18	**.69**	-.19	-.12	-.19	**.74**
S5	-.08	.06	-.21	**.63**	-.09	-.14	**.69**	-.11	-.20	**.71**	-.16	-.04	-.22	**.68**
S6	-.04	-.04	-.14	**.78**	-.04	-.08	**.78**	.02	-.09	**.72**	-.11	-.07	-.13	**.78**
Eigenvalue	2.46	1.87	1.96	3.43	2.73	2.60	3.79	2.60	2.49	3.67	2.75	1.83	2.14	3.88
Explained variance	15%	12%	12%	21%	17%	16%	24%	16%	16%	23%	17%	11%	13%	24%
n	1172				1970			766			1319			
Sub-scale correlation, shared variance (R²)[e]	SD/DA	D/S	DA/S	D/SD	D/S	DL/S	D/DL	D/S	DL/S	D/DL	SD/DA	D/S	DA/S	SD/S
	.147	.038	.035	.029	.050	.049	.008	.084	.066	.006	.131	.107	.065	.048

[a]Mean age (s.d.): 42.0 years (1.4).
[b]The groups with the highest skill levels (0: Armed forces, 1: Legislators/senior officials/managers, 2: Professionals, 3: Technicians/associate professionals, and 4: Clerks).
[c]The groups with the lowest skill levels (5: Shop/market sales and service workers, 6: Agricultural/forestry/fishery workers, 7: Craft and related trades workers, 8: Plant/machine operators, assemblers, and 9: Elementary occupations).
[d]SD: Skill discretion; DA: Decision authority.
[e]When four factors: Only the four highest R^2s are reported.

Table IV. Internal consistency of the Swedish Demand-Control-Support Questionnaire (DCSQ) sub-scales using Cronbach's α[a]

Index	Whole sample			Major occupational groups 0-4			Major occupational groups 5-9[b]			Total sample, split half 1[c]			Total sample, split half 2		
	Total	Men	Women	Total	Men	Women	Total	Men	Women	Total	Men	Women	Total	Men	Women
Psychological demands (D)	.73	.71	.75	.73	.71	.75	.72	.70	.74	.73	.71	.75	.73	.71	.75
Decision latitude (DL)	.74	.72	.74	.72	.67	.73	.71	.72	.70	.72	.69	.73	.75	.74	.75
-Skill Discretion	.62	.59	.64	.59	.56	.61	.59	.56	.60	.61	.57	.64	.63	.61	.64
-Decision Authority	.77	.74	.79	.76	.71	.78	.77	.75	.78	.75	.72	.77	.79	.77	.80
Social support (S)	.83	.82	.85	.83	.81	.85	.83	.82	.84	.83	.81	.84	.84	.82	.85

[a]Weighted for the different gender representation. See text for details.

[b]Deletion of item DL4 increased Cronbach's α for decision latitude: in total sample to .72 and in men to .74; for skill discretion: in total sample to .61, in men to .60 and in women to .62.

[c]Deletion of the following items increased Cronbach's α in men: DL4 for decision latitude, to .70; D5 for demand, to .72.

Paper IV

Testing the Job Demand-Control-Support model with anxiety and depression as outcomes: The Hordaland Health Study

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Abstract

This study tested the strain/iso-strain, interaction and buffer hypotheses of the Job Demand-Control-Support model in relation to anxiety and depression.

5562 workers with valid Demand-Control-Support Questionnaire (DCSQ) scores were examined with the sub-scales of the Hospital Anxiety and Depression Scale as outcomes. Multiple statistical methods were applied.

The results confirmed the strain and iso-strain hypotheses. Generally, additive and not interaction effects were found between psychological demands, decision latitude and social support. The buffer hypotheses were refuted.

High demands, low latitude and low support individually, but particularly combined, are risk factors for anxiety and depression. Support is the DCSQ index most strongly associated with anxiety and depression in women. Assessment of psychosocial work environment may identify workers at risk, and serve as a basis for job-redesign.

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Introduction

The Job Demand-Control (-Support) [JDC(-S)] model has dominated research on occupational stress for more than 20 years (1). Although principally used in studies of cardiovascular health, a number of other health outcomes have also been examined. The JDCS model has three major components describing work place qualities: (psychological) demands, (decision) latitude (or control), and (social) support. According to the JDC model, a high latitude will reduce stress and increase learning, while high demands will increase both learning and stress. Karasek and Theorell hypothesized that high demands combined with high latitude ('active' jobs) lead to increased learning, motivation and development of skills (1). According to the *strain hypothesis*, these 'active' workers, being exposed to high demands, will also experience psychological strain (2, pp. 31-36). However, because of high latitude, their strain level is predicted to be average. Also employees in 'passive' (i.e. low demands/low latitude) jobs will obtain intermediate scores. On the other hand, workers in 'high strain' jobs (high demands/low latitude) will experience the most adverse reactions of psychological strain (fatigue, anxiety, depression, and physical illness). Workers in 'low strain' jobs (low demands/high latitude) "are ... made both happier and healthier than average by work" (2, p. 36).

One of the most controversial issues of the strain hypothesis concerns whether the association between demands and latitude represents an additive effect or a (multiplicative) interaction (1, 3, 4). Regarding the latter, the literature sometimes postulates a synergistic effect, and sometimes a buffering effect (4). The *buffer hypothesis* states that a high latitude level (i.e., above a certain threshold) prevents demands from increasing the risk of illness (1, 4).

In the 1980s social support was added to the Job Demand-Control model, resulting in the JDCS model (5). Correspondingly, the *iso-strain hypothesis* expands the strain hypothesis, predicting the most negative outcomes in jobs characterized by high strain combined with low support or social isolation ('iso-strain' jobs). The corresponding buffer hypothesis states that a support level above a certain threshold protects against the negative impact of high strain (1, 6).

The literature gives considerable support to the strain and iso-strain hypotheses, while conclusions regarding the interaction/buffer hypotheses are still unsettled (1). The confirmation of possible buffer effects, however, would have important implications: Job-(re)designers could focus on the moderating effects of latitude (to reduce strain) and support (to reduce iso-strain), while the reduction of demands would be less important.

Considering Karasek & Theorell's many referrals to depression and anxiety (2, 7), and the large number of studies that have tested the central hypotheses of the JDC(-S) model, surprisingly few have used anxiety and depression as outcomes (1). Adverse job conditions, as a major source of stress, may lead to the development of anxiety and depressive symptoms (2, 8-10). Anxiety and depressive disorders are major public health problems, and represent a considerable economic burden to society, particularly through sickness absence and reduced capacity at work (11, 12). Thus, identification of possible anxio- and depressogenic agents in the work environment followed by appropriate interventions might have important clinical and economical implications.

Several of the studies testing the JDC(-S) model with depression as outcome have used only parts of a depression inventory and/or only caseness of depression as outcome. The latter may be problematic because of the Healthy Worker Effect (13): it is to be expected that the main part of the variation in symptomatology among employed subjects is found in the sub-clinical area. The same objections could also be raised against the few studies using anxiety as outcome. Both anxiety and depressive disorders are frequent, and they are often co-morbid (14). There is also a high inter-correlation between anxiety and depressive symptoms. Thus it is important to study both conditions simultaneously (15). Further, population based studies, covering a wide range of occupational groups, are scarce. Finally, few researchers have systematically examined the different operationalizations of the postulated interactions, as summarized by Landsbergis and Theorell (16).

The aim of this study was to test the strain, iso-strain and interaction (including buffer) hypotheses, with the sub-scales of the Hospital Anxiety and Depression Scale (HADS) as outcomes, in a large Norwegian population-based study of men and women living and working in both urban and rural settings. The following research questions were posed:

1) To what extent are psychological demands, decision latitude and social support in the work place, and the composite indexes strain (demands divided by latitude) and iso-strain (strain divided by support) associated with levels of anxiety and depression ?

2) Are there interaction effects between demands and latitude, and between strain and support regarding levels of anxiety and depression?

3) Is gender a moderator for the possible associations in 1)?

4) To what extent may the possible associations in 1) be explained by other work place characteristics, demographics, individual lifestyle and somatic health problems?

Material and Methods

Study population

The Hordaland Health Study 1997-99 (HUSK) was conducted as a collaboration between the National Health Screening Service, the University of Bergen and local health services. The study population included the 29400 individuals born between 1953 and 1957 who resided in Hordaland county (of Western Norway) December 31, 1997. A total of 8598 men and 9983 women participated, yielding a participation rate of 57 % for men and 70 % for women.

Data collection in HUSK was performed in two steps. The first step, which was identical for all participants, included a self-administered questionnaire and a health examination. In the second step, the participants were given one of two different questionnaires. Randomly about half of the men and 75% of the women were given the Swedish Demand-Control-Support Questionnaire (DCSQ). The present study encompassed only workers (defined as having worked at least 100 income giving hours the preceding year) who had valid DCSQ and HADS ratings and valid responses on the other variables used here. This comprised 2463 men and 3099 women, constituting 60 and 63%, respectively, of the male and female workers who were given the DCSQ.

Measurements

Anxiety and depression

Levels of anxiety and depression were assessed by HADS, which has been found to perform well in assessing symptom load and caseness (i.e., possible cases) of anxiety and depressive disorders in both somatic, psychiatric and primary care patients as well as in the general population (15).

Each HADS item is scored on a four-point scale from zero to three, and the item scores are added, giving sub-scale scores from zero (minimum symptom level) to 21 (maximum symptom level) (17). Caseness was defined by a score of eight or above on HADS-A and/or HADS-D, as this cut-off level has been shown to give an optimal balance between sensitivity and specificity on Receiver Operating Characteristic (ROC) curves (15).

Psychological demands, decision latitude and social support in the work place

were assessed by DCSQ (Table 1), a 17 item questionnaire developed by Theorell et al, based on the Demand-Control (-Support) Model (2, 5, 16, 18). The demands and latitude sub-scales represent a shortened and modified version of Karasek's Job Content Questionnaire (16). The support items cover both supervisor and co-worker support, and are oriented toward the

atmosphere at the work-site.

Because of a translation error from Swedish into Norwegian, one of the latitude items had to be excluded ('Does your work require skills?'). However, the psychometric properties of the 16 item Norwegian version of the DCSQ have been found to be satifactory (B. Sanne et al., submitted for publication).

The latitude index consists of four items on intellectual discretion (skill discretion) and two on authority over decisions. In this study we decided to focus on latitude instead of skill discretion and decision authority, because much of the paper is devoted to research question 2), and most operationalizations of possible interactions concern latitude (16).

DCSQ uses a frequency-based grading for demands and control, and an intensity based grading for support. Each item is scored on a four-point scale from one to four, and the item scores are added, giving sub-scale scores from 5 (minimum level) to 20 (maximum level) for demands, and from 6 to 24 for support. Because of the excluded latitude item, latitude scores were multiplied with 6/5, giving scores from 6 to 24.

Possible confounding factors

Main occupation was manually classified according to Standard Classification of Occupations (19), whose structure is based on skill level, i.e., which technical and formal skills that are normally required (20). Other possible confounders included were: number of paid work hours per week; shift work, night work or duties (yes/no); level of physical activity at work; educational attainment; annual household income; marital status; children (yes/no), daily smoking (yes/no), alcohol consumption; level of leisure time physical activity; body mass index; musculo-skeletal problems (pain and/or stiffness of at least 3 months duration in the last 12 months, resulting in reduced work capacity or sick leave); chronic somatic diseases [having (had) myocardial infarction, angina pectoris, hypertension, stroke, asthma, chronic bronchitis, diabetes mellitus or multiple sclerosis]; and the physical composite score of the SF-12 Quality of Life Schedule.

Statistics

The continuous variables strain (demands divided by latitude) (16) and iso-strain (21) (strain divided by support) were constructed. Analyses were stratified by gender because of significant interactions between gender and each of the indexes demands, strain and iso-strain regarding levels of anxiety and depression.

Standardized regression coefficients (SRCs) and adjusted explained variances (R^2s)

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were used to examine the direction and strength of the associations between DCSQ indexes and mean HADS scores (Table 3). Significance testing of the SRCs was done after reducing the skewness of HADS-D, strain and iso-strain to 1.0 or below (Table 2) by power transformation. More precise dose-response relationships of the associations between DCSQ indexes and HADS levels were examined by Generalized Additive Model (GAM) curves (22), (Figure 1; latitude and support scores were inverted to get equal signs of the DCSQ indexes).

Possible interactions between demands and latitude were examined as follows:

1) examination of the associations between the composite strain index and the outcome variables (Table 3);

2) the "quadrant approach" (Table 4);

3) demands and latitude trichotomized - a graphical approach (Figure 2); and

4) the multiplicative interaction term 'demands x latitude'. A significant interaction was defined by a p-value less than 0.05 for the product 'demands x latitude', with both variables dichotomized (analysis of variance) (23).

For possible interactions between job strain and social support we examined:

1) the associations between the composite iso-strain index and the outcome variables (Table 3);

2) whether socially isolated, high-strain work carried the highest risk for anxiety and depression;

3) demands, latitude and support dichotomized by their medians (Table 5, Figure 3); and

4) the multiplicative interaction term 'strain x support', examined as described for 'demands x latitude'.

Possible interactions between gender and 1) DCSQ indexes; 2) job characteristics classified according to demands, latitude and support (Tables 4 and 5) were examined as described for 'demands x latitude'. Levene's test (of homogeneity of variances) showed that the variances of HADS-A and HADS-D scores differed significantly between the dichotomized groups of demands, latitude and gender, respectively. Accordingly, log transformation of HADS-A and HADS-D scores was done before significance testing of the multiplicative interaction terms (power transformation was not sufficient to remove the significant differences in variances). Possible confounders of the associations between DCSQ indexes and HADS scores were adjusted for in linear regression.

Significance level was set to $p = 0.05$ with two-sided tests. The analyses were performed by means of SPSS for Windows, version 11.0, S-PLUS, version 6.1 and Microsoft

Excel 97.

Ethics

The HUSK study protocol was cleared by the Regional Committee for Medical Research
Ethics of Western Norway and approved by the Norwegian Data Inspectorate.

Results

Anxiety levels were highest in women while depression levels were highest in men (Table 2).
Latitude scores were considerably higher and demands scores somewhat higher in men, while
support scores were highest in women.

Associations between HADS levels and DCSQ indexes

Anxiety and depression levels were positively associated with demands, strain
and iso-strain scores and negatively associated with latitude and support scores (Table 3). The
associations between HADS-A/HADS-D and the DCSQ indexes were generally linear, with
some of the curves slightly curvilinear or S-shaped (Figure 1). The associations were stronger
in men than in women, and stronger for support than for demands and latitude (Table 3). For
demands, strain and iso-strain the SRC and R^2 values were highest for anxiety scores, while
for latitude and support the corresponding values were highest for depression scores.

Confounding between the DCSQ indexes

Possible mediator effects of demands, latitude and support on each other in their respective
associations with HADS scores were examined by linear regression (Table 3). The effects of
each of these factors were mainly independent of the other two. Adjusting demands for
latitude, and latitude for demands, consistently increased the SRCs for demands and latitude,
respectively (mutual suppressor effects, because of the tendency towards simultaneously
high/low demands and latitude scores). However, adjusting demands and latitude for support
and vice versa consistently reduced the SRCs.

Interactions between psychological demands and decision latitude

The quadrant approach

The results confirmed the strain hypothesis: The 'high strain' group consistently showed
significantly higher HADS scores than the other three groups (Table 4). The 'active' and
'passive' groups had intermediate scores, while the 'low strain' group consistently scored

significantly lower than the other groups (except for HADS-D in women, where the 'low strain' did not differ significantly from the 'passive' group). Differences between the groups were largest for men ($p < 0.01$ for the interaction terms 'gender x job characteristics' regarding levels of anxiety and depression). Considerably more women than men had 'high strain' jobs (15% vs. 10%).

Demands and latitude trichotomized - a graphical approach

Demands and latitude were divided into tertiles. The following patterns of HADS levels across the resulting nine exposure cells further strengthened the strain hypothesis (Figure 2): The high demands/low latitude group had the highest, and the low demands/high latitude group the lowest scores (except HADS-D scores in women, where the intermediate demands/low latitude group had the highest score). For all levels of latitude, HADS scores decreased by decreasing demands levels, and for all levels of demands, HADS scores decreased by increasing latitude levels. This pattern was consistent for HADS-A in men, while it was weakest for HADS-D in women. Thus no buffer effect of latitude on demands was found.

The interaction term 'demands x latitude'

The significance levels of this interaction term were estimated after dichotomizing demands and latitude, 1) by their medians, and 2) by their 75th (demands)/25th (latitude) percentiles. The only significant interaction, a synergistic effect, was found in 1), for HADS-D in men ($p = 0.046$). Correspondingly, when including the interaction term, the adjusted R^2 increased from 0.050 to 0.052 ($p = 0.046$ in F test for R^2 change).

Interactions between job strain and social support

Socially isolated, high-strain work ('iso-strain')

The combination of high demands, low latitude and low support was examined regarding levels of anxiety and depression. In accordance with the iso-strain hypothesis, the higher the demands and the lower the latitude and support, the higher were the anxiety and depression levels. This pattern was strongest for men. For example, the 92 men and women above the 80th percentile for demands and below the 20th percentile for both latitude and support, had mean scores of 7.5 and 5.8 on HADS-A and HADS-D, respectively. The corresponding scores for the 35 men were 8.5, which is above the cut-off level for caseness (95% CI: 7.1-10.0), and 7.2 (95% CI: 5.9-8.4).

Demands, latitude and support dichotomized by their medians

HADS scores were examined for the eight different combinations of high/low levels of demands, latitude and support (Table 5, Figure 3). For both genders the iso-strain group had the highest, and the low demands/high latitude/high support group the lowest HADS scores, thus confirming the iso-strain hypothesis. Differences between the groups were largest for men (p < 0.01 for the interaction terms 'gender x job characteristics' regarding anxiety and depression levels). Female groups with low support had significantly higher anxiety and depression levels compared to those with high support.

The predominant effect of support in women could represent a buffering effect of support on strain. Therefore, the analysis was repeated in the female sample after dividing support into tertiles: The four groups with the least support had significantly higher HADS-A and HADS-D scores than the other eight groups, while the four groups with the intermediate support levels generally had significantly higher HADS scores than the groups with the most support (data not presented). Thus, a buffering effect of support on strain was not seen.

The interaction term 'strain x support'

The significance levels of this product were estimated after dichotomizing strain and support, 1) by their medians, and 2) by their 75th (strain)/25th (support) percentiles. No significant interactions were found.

Gender as a moderator for the associations between HADS levels and DCSQ indexes

Gender interacted significantly with demands, strain and iso-strain regarding both HADS-A and HADS-D scores, thus the SRC values for these variables were significantly larger in men than in women.

Repetition of the analyses with caseness of anxiety and depression as outcomes

The preceding analyses were repeated with anxiety and depression caseness as dependent variables in logistic regression. The results of these examinations strongly agreed with the preceding findings (data not presented due to space limitations).

Mediators for the associations between HADS levels and the DCSQ indexes

When the associations between HADS scores and DCSQ indexes were adjusted for possible confounders in linear regression, none of the SRC values changed significantly, neither when

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adjusting for the variables one by one, groups based on themes ('demographics', 'lifestyle' etc), nor for the combination of all variables. However, when adjustment for all variables was combined with adjustment for other DCSQ sub-scales, SRC values for support and strain were generally reduced to below the lower limit of the 95% CIs for crude SRCs (table 3).

Discussion

Anxiety and depression levels and caseness increased linearly and considerably with increasing demands, strain and iso-strain scores and with decreasing latitude and support scores. Demands, latitude and support were each independently associated with anxiety and depression levels. Our results confirmed the strain and iso-strain hypotheses in both genders. There was a significant interaction between demands and latitude with regard to levels of depression in men, representing a synergistic and not a buffering effect. High strain and iso-strain as risk factors for anxiety and depression were strongest in men. Support was the index most strongly associated with anxiety and depression in women. None of the associations between HADS scores and the DCSQ indexes could be explained by the potential confounders examined.

Study limitations

The most important limitation of the study is its cross-sectional design. Nevertheless, the results consistently show that perceived adverse psychosocial work environment is a risk factor for anxiety and depression. The restricted age range may limit the generalizability of the findings. However, demands, latitude and support scores have been found to vary little with age (24, 25).

The moderate participation rate warrants some remarks. Non-responders to surveys have been found to have a higher prevalence of mental disorders (26, 27), and dropout of highly "stressed" individuals is a considerable problem (28). Congruent with the Healthy Worker Effect (13), we found that unemployed had considerably higher anxiety and depression levels than workers. Thus in the present study it is probable that anxious, depressed and highly "stressed" individuals are underrepresented. This would lead to an underestimation of the associations between negative affects and the DCSQ indexes. It is also likely that the proportion of working individuals (the target group) was higher among those who participated compared to those who did not.

The fact that participants select themselves out of high strain occupations (2, 18) may cause an underestimation of the risk associated with high strain.

Self-reports on demands, latitude and support may be biased towards the negative in individuals with poor psychological well-being, particularly the depressed, while workers with good mental health may under-report job stressors (3, 29). Thus, the associations between HADS and the DCSQ indexes may be overestimated, especially between depression and support, as the support items are oriented towards how the worker perceives the atmosphere at the work-place. The problem is also potentially significant with regard to demands, but is probably not important for latitude, because of the high self-report - observer inter-reliability for the latter index (28). However, studies not using self-report to assess work place characteristics are generally non-supportive of the JDC(-S) model, suggesting that the way in which the individual experiences work characteristics is crucial to their effects (1).

One of the most controversial issues of the JDC(-S) model concerns the construction of the decision latitude index by combining the theoretically distinct constructs skill discretion and decision authority (3, 4, 30). However, a distinction between skill discretion and decision authority in samples characterized by a heterogeneous set of occupations (as in the present study) is not indicated, since they correlate highly (24) and have been shown to combine into latitude in principal component analyses of such samples (B. Sanne et al., submitted for publication). The exclusion of one of the latitude items in this study did probably not compromise the psychometric properties of the questionnaire (B. Sanne et al., submitted for publication).

Relation to previous findings

The higher level of depression in men than in women in our study agrees with the findings from the large Norwegian population-based HUNT study, where the odds ratio for caseness of depression based on HADS was significantly higher in men (31).

The findings of increasing anxiety and depression levels with increasing demands and decreasing latitude and support are supported by both cross-sectional (6) and longitudinal studies (32-35). Independent effects of demands, latitude and support, respectively, are congruent with the low correlation which has been found between the three sub-scales (B. Sanne et al., submitted for publication). Also other studies have shown that support is the sub-scale most strongly associated with negative affects (6, 36) and that demands are at least as important as latitude in explaining the associations between high strain and anxiety and depression (6, 32). However, these results are not congruent with Karasek & Theorells statement that "the primary work-related risk factor appears to be lack of control." (2, p. 9). This may be explained by their focus on coronary heart disease, which in the Whitehall II

study was better predicted by latitude than by demands (37). Some researchers have hypothesized that the associations between the DCSQ indexes and outcome variables are curvilinear (1, 3). This hypothesis was generally not confirmed by our findings.

The strain hypothesis has been confirmed in the majority of cross-sectional studies examining male or gender-mixed samples related to psychological well-being and distress, while the iso-strain hypothesis has been confirmed in only about half of such studies (1). Two longitudinal studies have confirmed the strain hypothesis regarding depression, one in both genders (38) and one among women (39).

Few studies that have tested the JDC(-S) model with psychological distress as outcome have found significant (multiplicative) interactions (1), and even fewer have demonstrated buffer effects (1, 6). This could be due to the tendency to overestimate the strengths of the associations when using self-report measures (most studies) at the cost of underestimating the interaction effects, as well as inadequate specification and operationalization of the psychosocial work environment indexes (40). Although only one significant interaction was found in the present study, the other operationalizations of the interaction hypotheses showed rather strong associations between negative affects and adverse combinations of demands, latitude and support. Another example of the benefits of using complementary operationalizations when examining the interplay between DCSQ sub-scales, is the refutation of the buffer hypotheses by examining anxiety and depression levels for different combinations of demands, latitude and support (Tables 4 and 5, Figures 2 and 3).

The use of composite indexes like strain and iso-strain to "operationalize" the examination of possible interactions has been criticized, because such indexes make it impossible to tell whether there is a (multiplicative) interaction or not (4). We agree, but our results suggest that the use of composite indexes, particularly iso-strain in men, is a practical method to identify work associated with, and workers at risk for, anxiety and depression. Although not a common approach (1), we also used the strain index in the testing of possible (multiplicative) interactions ('strain x support'), thus avoiding the more complicated analyses of interactions between three separate variables.

The stronger associations between adverse psychosocial work environment and negative affects in men is congruent with most of the literature, which shows considerably less support for the negative impact of high strain in female employees (1, 18). The findings indicate that men and women are differently affected by high-strain work, possibly because of a relatively stronger influence of the psychological load at home compared to at work in women (18). However, some studies have found stronger associations between high job strain

and depressive disorders in women compared to men (39, 41). Nevertheless, these and other findings support the view that men and women should be examined separately (28), which has also been done in some of the most important studies (6, 33, 35).

The associations between HADS levels and the DCSQ indexes in HUSK could not be explained by socio-economic status (income, education and/or occupation), which is in accordance with other studies (2, p. 42; 42). Another possible explanation of these associations is personality traits, which were not assessed in HUSK. However, in the longitudinal GAZEL study, the prediction of depressive symptom worsening by adverse psychosocial work conditions was independent of personality traits (35).

Conclusion

The cross-sectional HUSK study confirmed that high demands, low latitude and low support individually, but particularly combined, represent risk factors for anxiety and depression in the working population. When studying possible interactions between demands, latitude and support, the use of different operationalizations may give complementary information. Assessment of psychological work environment may serve to identify workers at risk for anxiety and depression, as well as basis for job-redesigning. The latter may prevent new cases, and make it easier for anxious and depressed workers to stay at or return to work. Since no buffering effects of latitude (on demands) or support (on strain) were observed, it is important both to reduce demands and to increase latitude and support when called for. Nevertheless, the most important intervention in women is probably to increase social support. General practitioners should be made aware of perceived adverse psychosocial work environment as a risk factor for anxiety and depression.

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Table 1. The Swedish Demand-Control-Support Questionnaire (DCSQ)[a]

Subscale name and item number	Item text
Psychological demands (D)	
D1	Does your job require you to work very fast?
D2	Does your job require you to work very hard?
D3	Does your job require a too great work effort?
D4	Do you have sufficient time for all your work tasks?
D5	Do conflicting demands often occur in your work?
Decision latitude (L)[b]	
L1/SD1	Do you have the opportunity to learn new things in your work?
L2/SD2	Does your job require creativity?
L3/SD3	Does your job require doing the same tasks over and over again?
L4/DA1	Do you have the possibility to decide for yourself *how* to carry out your work?
L5/DA2	Do you have the possibility to decide for yourself *what* should be done in your work?
Social support (S)	
S1	There is a quiet and pleasant atmosphere at my place of work.
S2	There is good collegiality at work.
S3	My co-workers (colleagues) are there for me (support me).
S4	People at work understand that I may have a "bad" day.
S5	I get along well with my supervisors.
S6	I get along well with my co-workers.

[a]The translation into English from the Norwegian version was done by the authors, and is not authorised.

[b]Control. SD: Skill discretion; DA: Decision authority. The decision latitude (skill discretion) item "Does your job require skills?", was excluded from the study due to a translation error.

Table 2. Descriptive characteristics of the HADS[a] and DCSQ[b] indexes in The Hordaland Health Study

Variables	Men (N = 2463)			Women (N = 3099)		
	Mean	Standard deviation	Skewness	Mean	Standard deviation	Skewness
HADS-A	4.32[e]	3.04	0.87	4.60	3.19	0.77
HADS-D	3.41[e]	2.83	1.08	2.72	2.67	1.45
Psychological demands	13.81[e]	2.72	-0.13	13.40	2.91	-0.16
Decision latitude	18.41[e]	3.19	-0.81	17.41	3.41	-0.56
Social support	19.05[e]	2.84	-0.30	19.45	2.89	-0.36
Strain[c]	0.77[e]	0.23	2.23	0.81	0.28	2.00
Iso-strain[d]	0.04	0.02	4.22	0.04	0.02	2.70

[a]HADS: Hospital Anxiety and Depression Scale; HADS-A: Anxiety score, HADS-D: Depression score.

[b]DCSQ: The Swedish Demand-Control-Support Questionnaire.

[c]Strain: Psychological demands divided by decision latitude score.

[d]Iso-strain: Strain divided by social support score.

[e]Significant gender differences (independent samples T-test: $p < 0.05$)

Table 3. Associations[a] between the HADS[b] and DCSQ[c] indexes in the Hordaland Health Study

	Men								Women							
	HADS-A				HADS-D				HADS-A				HADS-D			
	SRC[a]			R^2	SRC			R^2	SRC			R^2	SRC			R^2
DCSQ indexes	Crude	Adjusted[d]			Crude	Adjusted[d]			Crude	Adjusted[d]			Crude	Adjusted[d]		
		1	2			1	2			1	2			1	2	
Psychological demands	0.22	0.22	0.23	0.05	0.14	0.15	0.16	0.02	0.14	0.13	0.13	0.02	0.08	0.07	0.07	0.01
Decision latitude	-0.14	-0.15	-0.11	0.02	-0.20	-0.20	-0.16[g]	0.04	-0.10	-0.09	-0.06	0.01	-0.14	-0.12	-0.10	0.02
Social support	-0.28	-0.21[g]	-0.20[g]	0.08	-0.30	-0.24[g]	-0.23[g]	0.09	-0.26	-0.22	-0.22[g]	0.07	-0.26	-0.23	-0.23	0.07
Strain[e]	0.26	0.22[g]	0.20[g]	0.07	0.24	0.20[g]	0.17[g]	0.06	0.16	0.13	0.12[g]	0.03	0.14	0.11	0.09[g]	0.02
Iso-strain[f]	0.30		0.28	0.09	0.29		0.25	0.08	0.22		0.21	0.05	0.22		0.20	0.05

[a]Standardized regression coefficients (SRCs) and adjusted explained variances (R^2). $P < 0.001$ for all SRC values.

[b]HADS: Hospital Anxiety and Depression Scale; HADS-A: Anxiety score; HADS-D: Depression score.

[c]DCSQ: The Swedish Demand-Control-Support Questionnaire.

[d]Adjusted 1: Adjusted for other DCSQ sub-scales only (demands adjusted for latitude and support, latitude for demands and support, support for demands

and latitude and strain for support). Adjusted 2: Adjusted for both other DCSQ sub-scales and other possible confounders (see Measurements; confounders).

[e]Strain: Psychological demands divided by decision latitude score.

[f]Iso-strain: Strain divided by social support score.

[g]Below lower limit of 95% confidence interval for crude SRC after adjustment.

Table 4. Job characteristics classified according to psychological demands and decision latitude[a], and mean HADS[b]

scores (95% confidence interval). The Hordaland Health Study

Job types	Men			Women		
	n (%)	HADS-A	HADS-D	n (%)	HADS-A	HADS-D
'High strain'	241 (9.8)	5.95 (5.49-6.40)	5.03 (4.61-5.45)	472 (15.2)	5.30 (5.00-5.60)	3.13 (2.87-3.38)
'Active'	755 (30.7)	4.74 (4.52-4.95)	3.46 (3.26-3.66)	649 (20.9)	4.83 (4.58-5.08)	2.71 (2.50-2.93)
'Passive'	551 (22.4)	4.27 (4.01-4.52)	3.71 (3.47-3.95)	977 (31.5)	4.68 (4.48-4.89)	2.98 (2.81-3.15)
'Low strain'	916 (37.2)	3.59 (3.42-3.76)	2.77 (2.61-2.93)	1001 (32.3)	4.04 (3.86-4.22)	2.28 (2.13-2.43)

[a]High and low demands/latitude scores: Above or below median, respectively. 'High strain': High demands/low latitude;

'active': high demands/high latitude; 'passive': low demands/low latitude; 'low strain': low demands/high latitude.

[b]Hospital Anxiety and Depression Scale; HADS-A: Anxiety score; HADS-D: Depression score.

Table 5. Job characteristics classified according to psychological demands, decision latitude and social support[a], and mean HADS[b] scores (95% confidence interval). The Hordaland Health Study (cf. figure 3)

Job types	Men			Women		
	n (%)	HADS-A	HADS-D	n (%)	HADS-A	HADS-D
High D / low L / low S	158 (6.4)	6.48 (5.90-7.06)	5.67 (5.14-6.20)	291 (9.4)	5.95 (5.55-6.35)	3.64 (3.28-4.00)
High D / low L / high S	83 (3.4)	4.94 (4.25-5.63)	3.81(3.19-4.42)	181 (5.8)	4.26 (3.84-4.68)	2.30 (1.98-2.62)
High D / high L / low S	340 (13.8)	5.18 (4.86-5.50)	4.02 (3.70-4.33)	283 (9.1)	5.61 (5.21-6.00)	3.24 (2.91-3.58)
Low D / low L / low S	287 (11.7)	4.58 (4.22-4.94)	4.22 (3.87-4.57)	450 (14.5)	5.42 (5.11-5.74)	3.57 (3.30-3.85)
High D / high L / high S	415 (16.8)	4.37 (4.09-4.66)	3.00 (2.75-3.24)	366 (11.8)	4.23 (3.92-4.54)	2.30 (2.03-2.57)
Low D / low L / high S	264 (10.7)	3.93 (3.58-4.28)	3.15 (2.84-3.47)	527 (17.0)	4.05 (3.79-4.30)	2.48 (2.28-2.68)
Low D / high L / low S	336 (13.6)	4.47 (4.17-4.77)	3.49 (3.20-3.78)	279 (9.0)	4.88 (4.51-5.25)	3.08 (2.76-3.39)
Low D / high L / high S	580 (23.5)	3.08 (2.88-3.28)	2.35 (2.17-2.53)	722 (23.3)	3.71 (3.51-3.91)	1.97 (1.81-2.13)

[a]High and low demands (D), latitude (L) and support (S) scores: Above or below median, respectively.

[b]Hospital Anxiety and Depression Scale; HADS-A: Anxiety score; HADS-D: Depression score.

**Figure 2. Mean HADS[a] scores according to psychological demands and decision latitude tertiles**
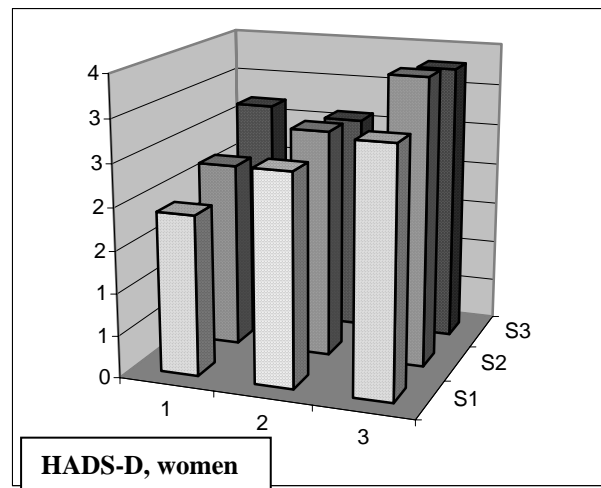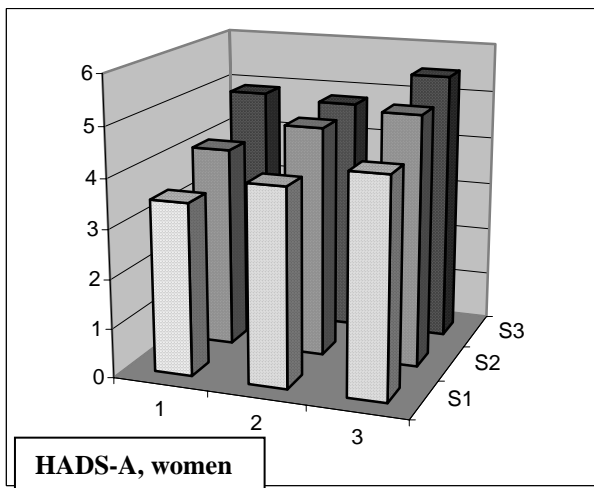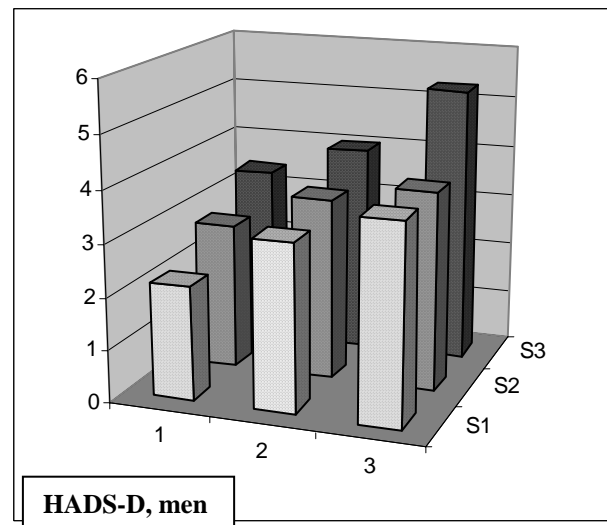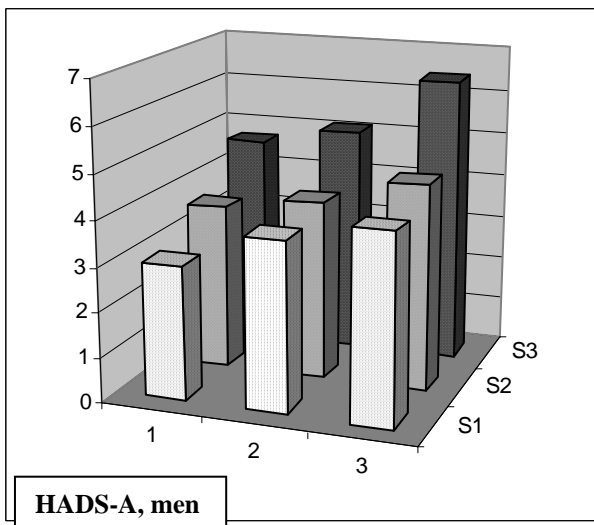
1, 2 and 3: High, intermediate and low latitude scores, respectively.

S1, S2 and S3: Low, intermediate and high demands scores, respectively.

[a]HADS: Hospital Anxiety and Depression Scale; HADS-A: Anxiety score; HADS-D: Depression score.

Figure 1. Associations of mean HADS[a] scores and DCSQ[b] indexes in the Hordaland Health Study
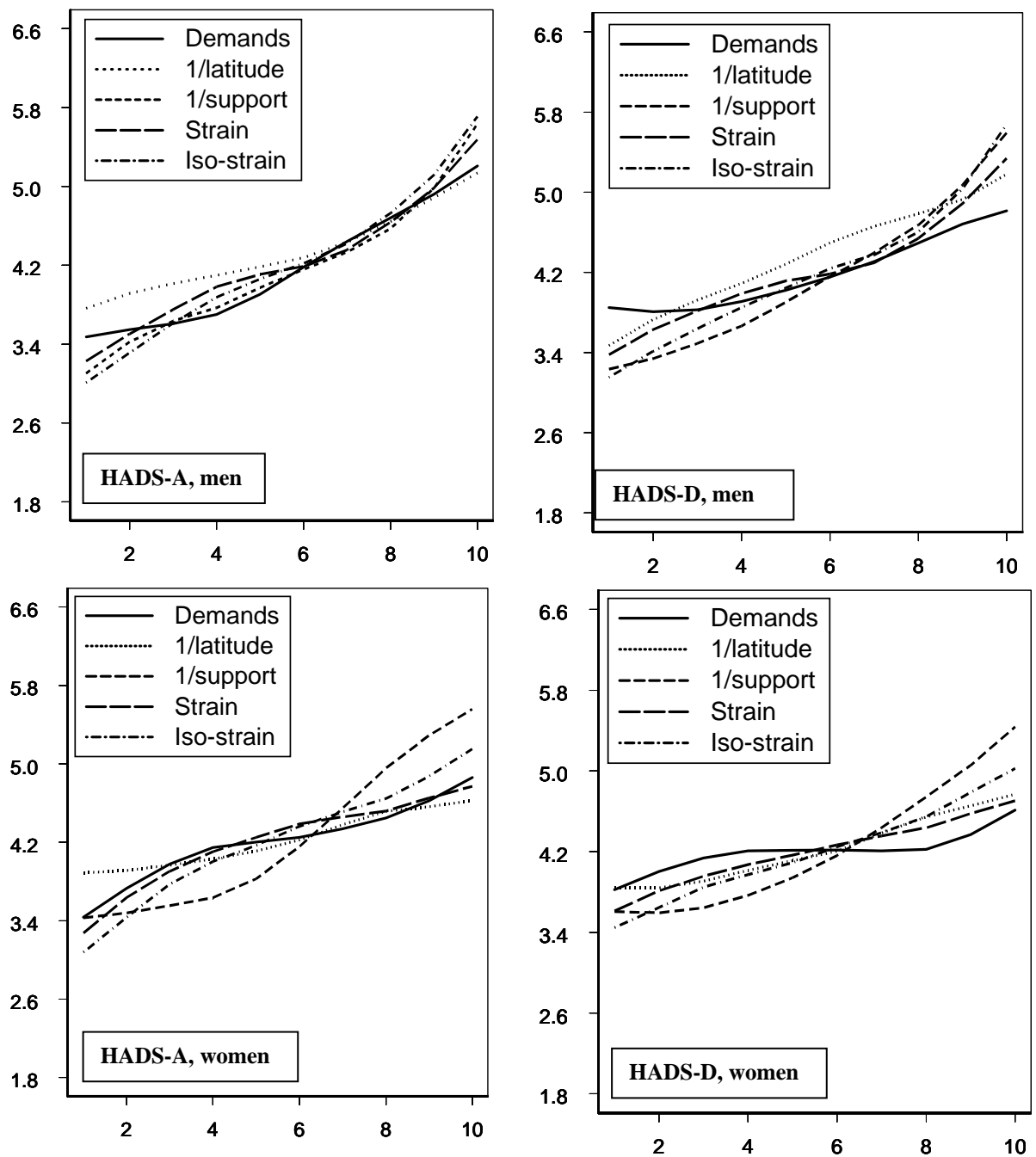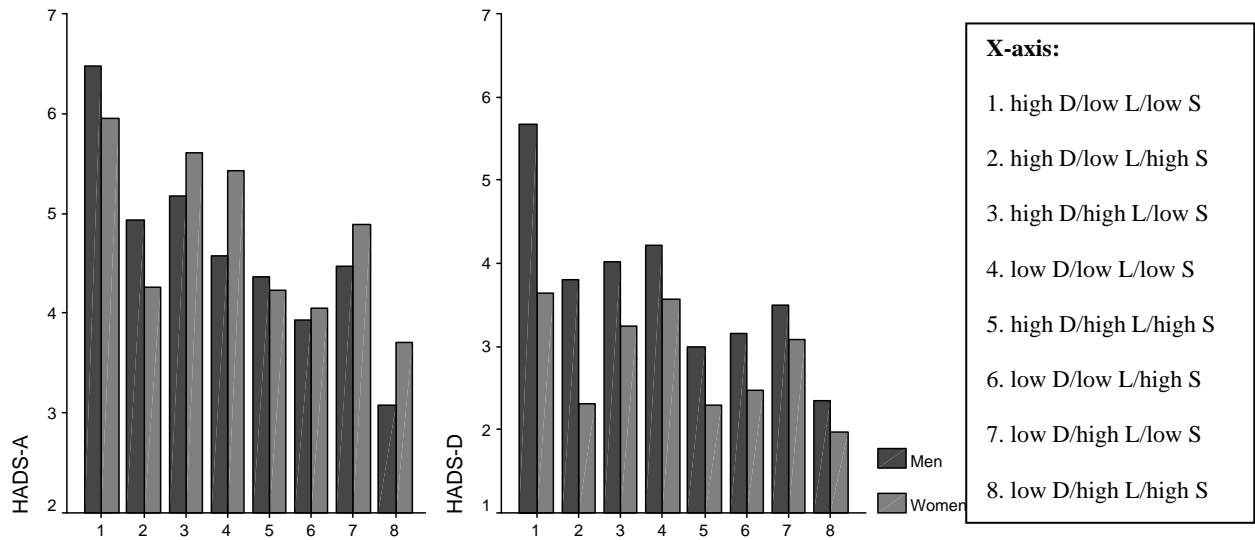

X-axis: Percentile based groups (gr. 1: 0-10 perc., gr. 2: 11-20 perc. etc)

[a]Y-axis: Hospital Anxiety and Depression Scale (HADS) scores. HADS-A: Anxiety score; HADS-D: Depression score.

[b]DCSQ: The Swedish Demand-Control-Support Questionnaire.

Figure 3. Job characteristics classified according to psychological demands[a], decision latitude and social support, and mean HADS[b] scores. The Hordaland Health Study (cf. table 5)

[a]High and low demands (D), latitude (L) and support (S) scores: Above or below median, respectively.

[b]Hospital Anxiety and Depression Scale; HADS-A: Anxiety score; HADS-D: Depression score.